A HITCHCOCK PUBLICATION

DECEMBER • 1960

assembly & fastener ENGINEERING

CREED FOR TODAY:

Prove all things; hold fast that which is good

See Christmas Editorial

and here's how Pheoll solved it

He's skimming the surface now—yet a short time ago this design engineer was "knee-deep" in a 2-way fastener problem: First, how to hold a board absolutely rigid against the flange guide of a table saw; and second, how to produce the fastener on a simplified and economical basis. Originally, his company tried using an ordinary "C" clamp, but later switched to a hand-assembled 3-piece post clamp. This too proved costly and inadequate.

Pheoll came into the picture and immediately reduced material costs and eliminated a bending operation; replacing a four slide part with a cold headed thumb screw. Then Pheoll dog-pointed and end-drilled the bottom of the thumb screw which allowed the attachment of a permanent spinning grip washer. Previously, this piece consisted of three parts manufactured by three separate industries.

Pheoll automatically produced and assembled the one-piece unit, shipping it to the table saw manufacturer at lower costs—with none of the previous manufacturing, assembly or inventory problems. *This is Pheoll in action*—a versatile, cost-conscious, quality-minded team ready to serve you...the next time you have a fastener problem.

Pheoll Manufacturing Company, Inc.

5700 WEST ROOSEVELT ROAD CHICAGO 50, ILLINOIS

PHEOLL

HEADING THE FASTENER INDUSTRY FOR OVER 50 YEARS

Use postpaid card. Circle No. 1

assembly & fastener ENGINEERING

December, 1960 Volume 3, Number 12

FEATURES

Prove All Things; Hold Fast That Which Is Good 7
A Christmas message reflecting upon the need for people as individuals to prove themselves worthy of the dignity of man.

Vending Machines Require Built-In Reliability 28
How one company assembles sales dispensing devices which must operate reliably as "lone operators".

Readers Forum: Lubrication vs. Torque 35
Supplementary data to our cover story in September on the effect of lubrication on bolt torque.

A Look at Corrosion-Resistant Fasteners 38
Presenting some engineering, aesthetic and economic reasons for specifying fasteners made from non-ferrous and stainless steel alloys.

Perforated Metal Boards Economize Cable Assembly 42
Plywood boards with nails are obsoleted at Raytheon with switch to aluminum boards and steel pins.

Simple Tools Facilitate Small Motor Assembly 45
Changeover from automatic machines to hand tools for handling laminations leads to better over-all net economy.

Indexing Unit Speeds Component Soldering 48
Semi-automatic machine produces one soldered assembly every 10 seconds. Former production rate was one assembly every three minutes.

DEPARTMENTS

2 Letters to the Editor
9 The State of Business
13 Industry at Work
19 Assembly & Fastening Ideas
23 Reports from the Field
50 As Smitty Sees It
53 What's New in Equipment
61 What's New in Fasteners
69 Useful Literature
77 Industry Makes News
87 Product Index
90 One Last Word

• Our Christmas editorial on page 7 reflects upon the noble purpose of our life, a purpose which each individual must determine and achieve by himself.

EDITORIAL STAFF

William F. Schleicher
VP and editorial director

Matt E. Heuertz
Managing editor

Darrell Ward
Engineering editor

Rudy Mate
Associate editor

William D. Engstrand
West Coast editor

Nina Schmale
Reader's service

Vic Erickson
Cover art

Bob Hadley
Art director

BUSINESS STAFF

Robert C. Van Kampen
Chairman of the board

O. A. Feldon
President

E. P. Madigan
Secretary

Vincent C. Hogren
Executive vice president

John S. Todd
Production manager

D. L. Campbell
Adv. production manager

Raymond J. Sietsema
Director of research

Gene West
Fulfillment manager

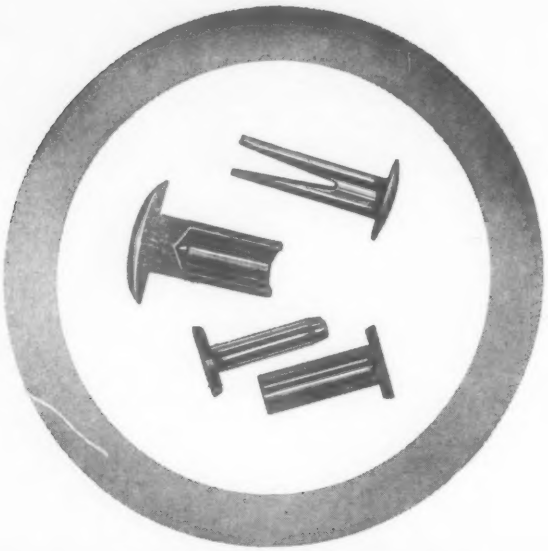
Robert J. Spreckels
Circulation manager

Bruce B. Howat
Marketing director

Oliver S. Pepper
Customer Svc. manager

BPA Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

Copyright 1960 by Hitchcock Publishing Co., Wheaton, Ill. Phone MOntrose 5-1000. Cable address: HITCHPUB.



COST-CUTTING PRODUCTION TEAM!

. . . the two-way answer to assembly problems

Here's a combination that cuts production costs and gets rid of assembly problems in a hurry—Milford Tubular Rivets made to high quality standards to assure a better finished product for you... Milford automatic rivet-setting machines that can be quickly adapted to your particular fastening needs.

Milford's MANUAL OF MODERN RIVETING PRACTICE may have the answers to your riveting problems. Ask a Milford Representative to show you how to use this manual to cut production costs.

THE MILFORD RIVET

MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • NORWALK, CALIFORNIA
ELYRIA, OHIO • AURORA, ILLINOIS • HATBORO, PA

Use postpaid card. Circle No. 204

Letters to the Editor

Audio-Visual Systems

I found your November cover story, "Will Audio-Visual Systems Obsolete Assembly Lines?", very interesting, inasmuch as we are now using several stations incorporating this new concept. If possible, we would like to have a reprint of this article.

E. A. Meade
Asst. Plant Manager
Gilfillan Bros. Inc.
Los Angeles, Calif.

• This article has not been reprinted, but tear sheets are available as long as the supply lasts.

Buying Fasteners

Your publication is far reaching in helping purchasing men keep abreast of developments in the finer aspects of buying fasteners.

Josef S. Gadziola, Buyer
The Electric Autolite Co.
Syracuse, New York

Blind Rivet Trimmer

Regarding the air tool attachment for trimming blind rivets, as mentioned on page 20 of your September 1959 issue, would you send us more information.

M. W. Scott, Liaison
North American Aviation, Inc.
Downey, California

• Further information is available from Doedon Tool Corp., Sherwood, Ohio

Computerese

We would enjoy receiving the booklet, "Eighty-Two Computer Terms", as mentioned in your column "As Smitty Sees It", compliments of Minneapolis-Honeywell.

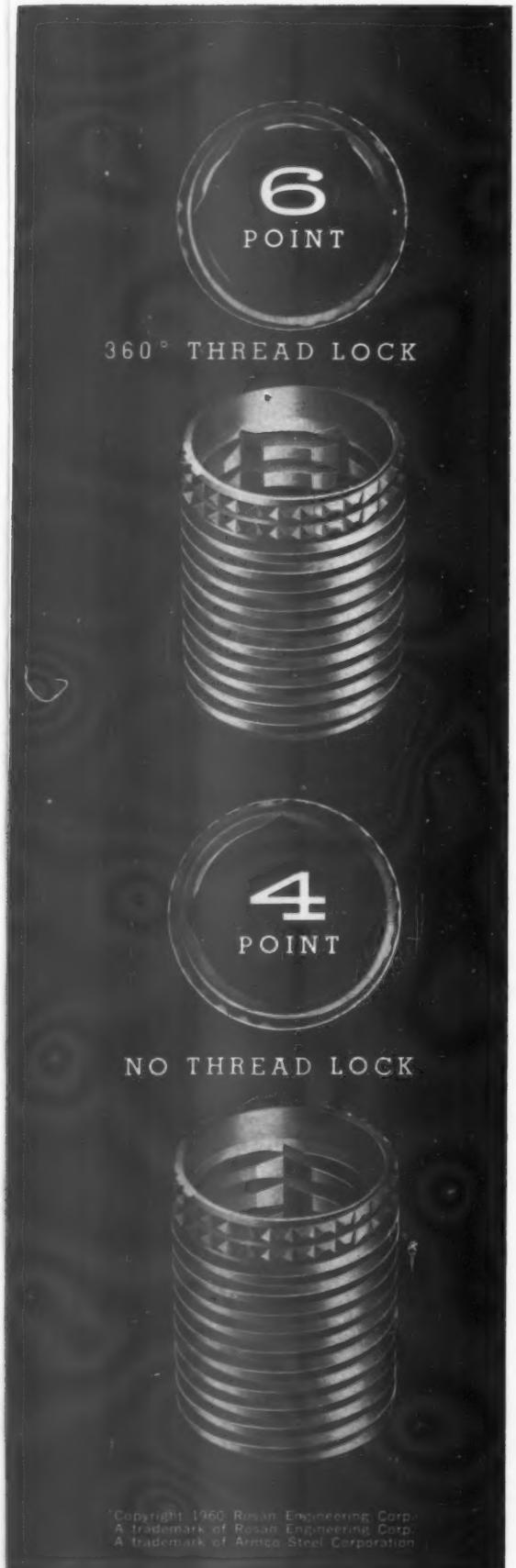
Grant T. Wagner
Design Engineer
Chicago Bridge & Iron Co.
Salt Lake City, Utah

Would you please send me the 22-page booklet, full-o-cartoons and explaining some 82 computer terms. . . .

D. H. Renner, Mfg. Engrg.
Locomotive & Car Equipment
General Electric Company
Erie, Pennsylvania

In Smitty's column in October, you mention a booklet on computer terminology. Please send me a copy.

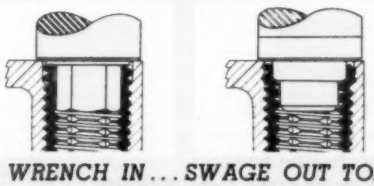
Robert C. Walters
Value Engineering Dept.
Government & Indus. Group
Philco Corporation
Philadelphia, Penna.



CHECK

THESE IMPORTANT DESIGN FEATURES OF SLIMSERT* INSERTS BY ROSÁN

- ✔ **ONE PIECE** structural type insert fastener, solid column, ready for installation.
- ✔ **STRUCTURAL SUPPORT** to panel in fastener area, 200,000 PSI. Joint in most materials; aluminum, magnesium, cast aluminum, cast magnesium, cast iron, plastics.
- ✔ **LOADS TRANSMITTED** uniformly throughout the total threaded column.
- ✔ **HIGH FATIGUE.**
- ✔ **VIBRATION PROOF** external lock. Unique 360° uniform frictional distribution design.
- ✔ **HIGH COLUMN STRENGTH.**
- ✔ **HIGH YIELD.** 170,000 PSI minimum.
- ✔ **HIGH AXIAL LOAD FACTOR,** equal to or greater than mating bolt used.
- ✔ **LIGHTWEIGHT** typical SR 258L (¼-28 UNF3) = 98.4 grams, (.217 pounds) per 100 pcs.
- ✔ **CORROSION RESISTANT:** Fabricated from **ARMCO 17-4PH CRES. Equal to type 302 in most medias.
- ✔ **EASY, RAPID INSTALLATION** . . . standard tools, drills, taps, etc.
- ✔ **GUARANTEED** class #3 threads per MIL S-7742-A.
- ✔ **PRELUBED** for ease of installation & supplemental coated to exceed all requirements (MIL-L-25504).
- ✔ **POSITIVE IDENTIFICATION** of internal locking feature either in supply bin, or assembled in structure.
- ✔ **LONG LIFE** internal lock in excess of MIL-N-25027.
- ✔ **WIDE TEMPERATURE RANGE** offered in the standard Slimsert.* — 120° Fahrenheit to + 900° Fahrenheit. (Lox temperatures to + 1300° Fahrenheit available upon request.)
- ✔ **PROVEN PERFORMANCE** by combined tests conducted at Rosán engineering test laboratory facility, independent testing & research laboratories & customer's research & testing laboratories.
- ✔ **MANY** aircraft, missile & federal facilities have standardized on Slimsert* inserts since its May 23, 1960 release at the New York design show.
- ✔ **ENGINEERING** application service in key cities in the U.S.
- ✔ **ANOTHER ORIGINAL DESIGN** by Rosán Engineering Corp. U.S. patents granted & pending.
- ✔ **THIN-WALL SLIMSERTS** are manufactured & sold exclusively by Rosán, Inc.
- ✔ **SOURCE APPROVED SINCE 1942.**



WRENCH IN . . . SWAGE OUT TOP!

*All rights reserved; protected by issued and pending U.S. and foreign patents.

ROSÁN, INC.

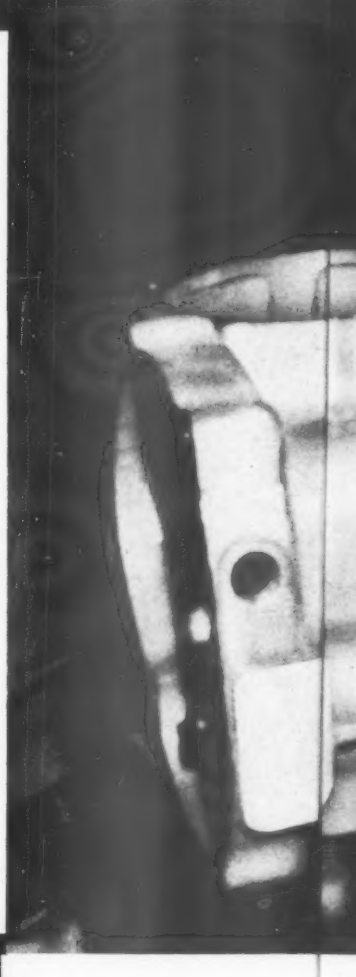
8901 West Coast Highway • Newport Beach, California

MAIN PLANT: Newport Beach, California • OFFICES: Los Angeles, Seattle, San Francisco, Newark, Dayton, Fort Worth, Detroit, Washington, D.C., UNITED KINGDOM & Continent of EUROPE.

Use postpaid card. Circle No. 205

Newest addition to industry's MOST PRODUCTIVE

ALL NEW
CP-6020
1/4" BOLT SIZE
IMPACT WRENCH
3/8" SQUARE DRIVE



The new CP-6020 is designed specifically to handle the popular ¼" bolt size with plenty of power and sock to meet any production schedule.

A real production line tool, this little wrench has 50% more power than previous models . . . gives you faster rundowns . . . longer tool life on repetitive jobs.

Power regulator provides adjustable power control to meet wide variety of assembly requirements.

Eight models available with choice of lever or offset handle, ⅜" square drive shank or three sizes (¼", 5/16" and 7/16") of hex. slip chucks.

Features include:

- *Light weight* . . . less than 2¼ lbs.
- *Styled for holding comfort* . . . easy maneuvering in tight spots.
- *Low clutch maintenance* . . . oil lubricated, more efficient, longer wearing . . . easier to service.
- *Convenient reverse valves* . . . the hand that holds the tool controls the reverse . . . other hand always free.

If your requirements call for a ¼" bolt size capacity Impact Wrench, it will pay you to look into the CP-6020. *Write for: SP-3270, today.*

OTHER CP BOLTING "PROBLEM SOLVERS"

Whatever your assembly problem, if it involves bolting, you'll find a CP Air Impact Wrench designed to handle the job quickly and economically . . . to exactly suit your requirements. The full line includes 52 different models with capacities ranging from ¼" to 1¾" bolt size.

Torque Control Models to meet "specified torque settings" are available. With this feature the wrench automatically ceases to impact the moment proper torque is reached.

Typical CP production line Air Impact Wrenches are shown at the right. For full details, write to: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

LINE . . . the CP-6020 IMPACT WRENCH!

FOR 3/8" BOLT SIZE

CP-3440 Heavy Duty, Reversible Impact Wrench. Choice of side or lever handle, ½" square drive or 7/16" integral hex. chuck. 90° Angle Head model with lever handle available for those hard-to-reach jobs.

FOR 5/8" BOLT SIZE

CP-3490 Heavy Duty, Reversible Impact Wrench. Choice of side or pistol grip handle, 5/8" square drive or 7/16" integral hex. chuck. Angle Head models available. Head can be used in any one of four 90° positions. All models are furnished with an adjustable power regulator.

FOR 3/4" BOLT SIZE

CP-3630 Heavy Duty Reversible Impact Wrench. Choice of side or pistol grip handle, ¾" square drive shank. Angle Head model, as shown, available for those "hard-to-reach" jobs. Integral 5/8" hex., quick change chuck available.

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • HYDRAULIC TOOLS • VACUUM PUMPS

Use postpaid card. Circle No. 206

THE STOVER LOCK NUT FAMILY CLAMPS DOWN ON COSTS AT EVERY TURN

Stover Automation Lock Nut, Grade B, for use with low carbon and medium carbon heat treated bolts and studs (SAE 2, 3, 5). Stocked in bulk containers and standard packages by authorized industrial distributors.

Don't let the simple appearance fool you: Stover Lock Nuts take 25% less tightening torque to reach required clamping loads than common nuts or competitive lock nuts. This means you can use smaller, lighter driving tools. Yet Stover Lock Nuts won't back off by themselves—seated or unseated. Moreover, they start like common nuts, run up smoothly without galling or seizing, can be hand or hopper fed, and are fully reusable.

Car and tractor makers, for example, used about 80 million Stover Lock Nuts last year. The money these companies saved in *either* purchasing, assembly, or service-in-the-warranty-period easily paid for the lock nuts' initial cost. Value—in spades!

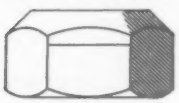
Stover Lock Nuts cost a little more than common nuts, but are very competitive with other lock nuts. They're available in bulk, with the popular styles also available through industrial distributors. Write us for the name of your nearest distributor, samples, or the just-published Stover Engineering Manual.

LAMSON & SESSIONS

5000 TIEDEMAN ROAD · CLEVELAND 9, OHIO

Plants in Cleveland and Kent, Ohio · Chicago and Birmingham

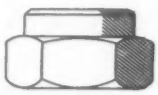
FIVE STANDARD STYLES



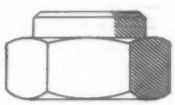
Automation
¼"– 1"
A basic nut for general use.

Flange
#8 – ½"
For clamping soft and/or thin materials.

Thin Hex Collar
¼"– 1½"
Used where space is a problem, such as on pinion and pulley shafts.



Hex Collar
⅜"– 2"
Lower on-torque in the larger sizes than Automation style.



Heavy Hex Collar
⅜"– 2"
Used where greater bearing surface is needed than available with Hex Collar style.

Use postpaid card. Circle No. 207

Prove all things; Hold fast that Which is good

I Thessalonians 5:21

Do we need to be admonished, at this Christmas season, to prove our faith and our belief in God? In the broader sense, is it necessary to prove our trust in liberty and freedom? Konstantin said, "The hero never ceases to prove his courage and his faith; when he merely accepts, he becomes a mouse among the lions".

Isn't religion, the freedom of religion, our believing and trusting in God, proving and living a life worthy of Him? It is not a church or a set of rules. Isn't democracy and liberty our believing in it, proving it with our thoughts and actions? It is not a thing called government or political party. Whether it be faith, democracy, freedom, liberty, peace, or any other set of words rubbed smooth with much tongue service—words which we throw about like so many pebbles—they are still merely we the people. And such greatness as may accrue to the world will come from only the people. And proving these things over and over again, and yet once again, and holding fast, and binding to us all those things which are fine and noble, that too is our job. Not the job of the government, of the church, of the United Nations, or any other institution. It is up to us, as individuals, to prove, to reaffirm, to protect, and also to go forth and tell all the world.

Too often we forget the individual, thinking we are but idle dust motes drifting aimlessly in a black vastness. We truly are motes, if we think we are! Yet, the Divine hand touched us all. A flame of greatness burns within each of us; it is but for us to prove it. Too often we cover this divine spark under shabby thoughts, half-hearted attempts, small fits and starts, and ignoble purposes. Too often we aspire to material gains, tossing aside deeper spiritual values, handling greatness like a pumpkin after Halloween. This is neither proving ourselves and our beliefs, nor holding fast to that which is good.

Are we going to prove our belief during the new year? Fight for it? Uphold righteousness? Be worthy of the dignity of man?

Christmas is generally such a happy time for the majority of people because each person feels a little closer to his Creator, feels the warmth of the Divine hand which guides. Each person is a little more anxious to prove these things and hold fast, if but for the brief life of the candle, these things which are good!

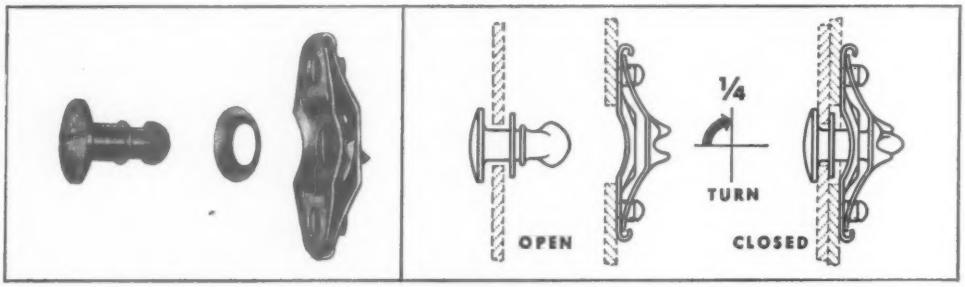
Prove all things—the love we bear our neighbors, the love we bear one another. Are we not of the same family? And if we prove these things at Christmas time, can we not prove them throughout the year? Let us hold fast to this—hold desperately fast to our God, our liberty, our democracy and above all—our dignity as men.

From the board of directors, the president, and the entire staff of the Hitchcock organization, may we wish you a truly happy Christmas and a new year filled with all the good things of life.

THIS PANEL CAN BE
OPENED OR CLOSED
IN LESS THAN 2 SECONDS

LION ¼ TURN OPEN ¼ TURN CLOSED FASTENERS

ARE FAST, POSITIVE, RELIABLE



Installation of the three parts of the Lion Fastener, shown above, is quick but not critical. Unique in design and performance, these mil spec (MIL-F 5591A-ASG) fasteners make possible quick access and smooth positive locking by only a ¼ turn.

ALIGNMENT NOT CRITICAL

Both stud and receptacle "float" to accommodate misalignment. The hole, which retains the stud, is twice as large as the stud cross-section. This permits a float of .070 in all directions. The leaf spring receptacle also floats to accommodate stud position.

WIDE VARIATIONS IN STACK HEIGHT

Total sheet thickness may vary as much as +.035 and −.015 without affecting operation. A Lion stud, specified for .160 total thickness, for example, will accommodate any stack height between .195 and .145.

SWAGED-NOSE STUD

Extra strength and smooth operation are made possible by the swaged-nose design. All the metal in the stud goes to work. There are no thin cross pins, holes or milled slots to weaken the cross-section. Case hardening is further assurance of long, trouble-free service.

WIDE VARIETY

Lion Fasteners are available in 3 sizes—No. 5, No. 2, and Miniature. An assortment of head styles are supplied—oval, flush, wing, ring, notched or knurled—according to individual requirements.

FREE!

FASTENER HANDBOOK

Send for your free copy of Southco Fastener Handbook No. 9. Gives complete engineering data on Lion Fasteners and other special fasteners. Write to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pennsylvania.

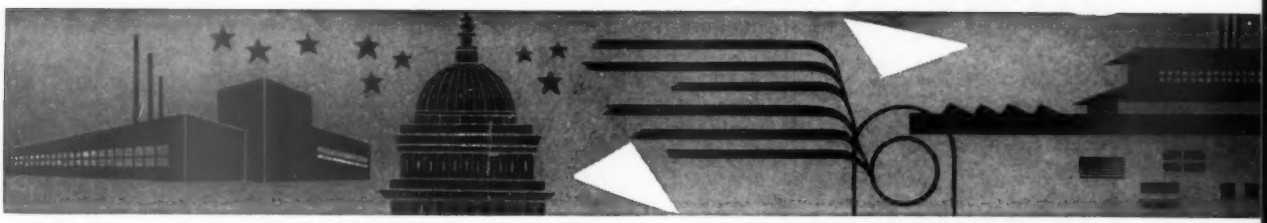
©1959

LION *Aviation* FASTENERS

one of the SOUTHCO LION FASTENERS

Use postpaid card. Circle No. 208

The State of Business



DOES EUROPE'S COMMON MARKET JUSTIFY RAISING U.S. TARIFFS?

by **Thomas D. Cabot**

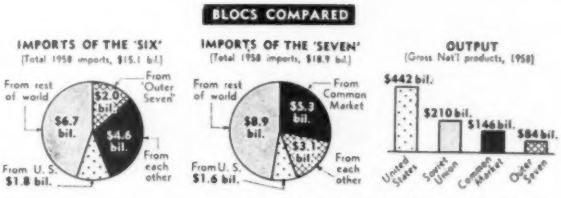
The European Common Market has brought together 160 million people of six nations to remove gradually all barriers to the movement of goods, people, capital and businesses across their common borders. This goal is to be achieved over a period of 12 to 15 years. It will be one of the most significant accomplishments of the Twentieth Century.

This is the great ambition of these Europeans to move on, after carving out their own unified trading area, to achieve the benefits of political and economic unity as the United States has done.

The Benelux nations, plus France, West Germany and Italy comprise the ECM. A measure of the area's commercial significance is that in the most recent year for which figures are available (1956), it conducted almost 23% of the total world trade, compared with 17% for the U.S.

The treaty which created the ECM, signed in Rome in March 1957, outlined broad objectives: elimination of tariffs and quotas on movement of goods; removal of restrictions on the movement of capital and labor across boundaries; establishment of a Social Fund to assist families of any workers whose well-being might be injured by the increased commercial competition which the treaty encourages; and other provisions.

The prospect of integration is not, however, all brightness for the rest of the free world. It could, quite possibly, solidify trade barriers between regions of the world rather than act as an agent for their liquidation. The most striking illustration of this is the problem of working out closer association between the Common Market and the one-year old European Free Trade Association, consisting of Austria, Denmark, Norway, Portugal, Sweden, Switzerland and Great Britain.



—*News of the Week in Review,* The New York Times.

And what still about the rest of the world? It comes down to the fact that even if tariffs faced by the rest of the world in selling to any one of the ECM or Outer Seven countries remain—on the average—unchanged, the tariffs faced by these countries in selling to each other will be reduced. In this way, each group of associated countries will "discriminate" against the rest of the world.

Whether the world moves in the direction of retaliatory restrictions or freer trade will depend upon decisions still to be made, decisions in which the U.S. will have a major influence.

While we believe that many aspects of the ECM will be beneficial to the rest of the world, the "discriminatory" aspects can hardly help being adverse to other countries, including the U.S. Thirty percent of our total exports (excluding military equipment) went to 17 countries in the Organization for European Economic Cooperation. Moreover, the U.S. has a strong interest in the effects of the new Market upon other areas, notably Latin America. One-third of Latin America's exports go to Western Europe.

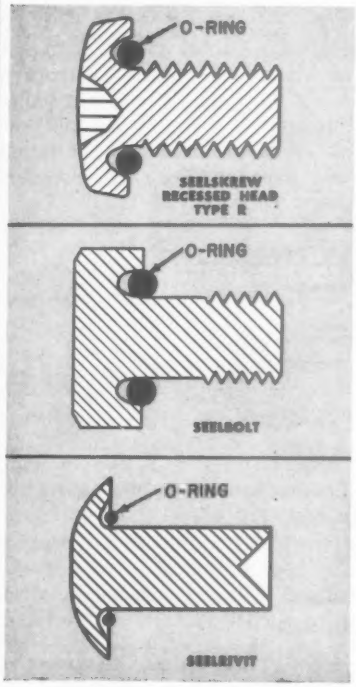
Nothing would be more valuable in preventing the new economic regionalism from degenerating

continued

THOMAS D. CABOT
President
Godfrey L. Cabot, Inc.

Distinguished Bostonian Tom Cabot's leadership in international trade, statesmanship and civic affairs fills 24 lines in "Who's Who in America."

SEELSKREWS*
SEELBOLTS*
SEELRIVITS*
High Pressure Self-Sealing
FASTENERS



- Removable and static self-sealing screws, bolts and rivets.
- These industrial fasteners meet all applicable military specifications.

SEND FOR CATALOG 359-A-25
describing items above, also seals for switches, shafts, circuit breakers, indicator lights and other electronic components.

*TRADE MARK

A.P.M. Corporation
252 Hawthorne Ave., Yonkers, N.Y.
YOnkers 8-2010

Designers and Manufacturers of
HIGH PRESSURE STATIC AND MOVABLE SEALS
Hexseals* • Seelskrews* • Seelbolts* • Seelrivits*

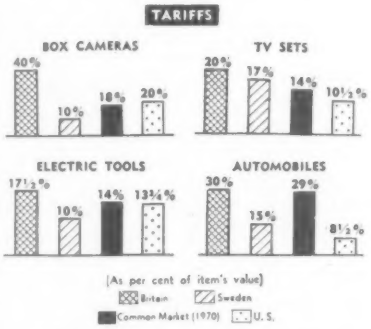
Use postpaid card. Circle No. 209

in a new economic isolationism than bold U.S. initiative for the reduction of trade barriers

The U.S. should negotiate with the expectation of making full tariff reductions authorized by law. We should seek a reduction of tariffs on the kinds of things we export, in exchange for a reduction of our tariffs.

The Trade Agreements Act would serve a more useful purpose if it provided that our tariff reductions be made for equivalent foreign concessions, but not necessarily of a tariff kind, such as better treatment of U.S. investors.

Fear has been expressed in recent months about the consequences of a large gold outflow from the U.S.—in 1958 on the order of $2¼ billion. It is held that this is due to pricing ourselves out of world markets. The recent moves toward a greater measure of convertibility in Western Europe have also been interpreted as being indicative of a loss of confidence in the dollar.



We believe the facts do not justify such conclusions. These developments should be interpreted as progress toward better balance in the world economy, better distribution of the world's monetary reserves, and freer and more equal competition in world markets. The increased strength of our chief allies and customers, who are also our competitors, should not be a cause for alarm.

Two lessons should be derived from this experience:

1) As the competitive power of other countries, and their reserves, increase we are entitled to expect and insist upon progressive dismantling of restrictions on U.S. exports that were justified by the former acute "dollar shortage."

2) We are not immune from the law that a country that inflates more rapidly than others will meet trouble in its foreign trade and payments. We shall have to pay more attention to keeping our own house in order —to restraining inflation and raising productivity.

The Common Market calls attention to our responsibility for increasing the opportunities for other nations to achieve development in a free world providing access to all markets. To the extent that we are able to do this we increase the likelihood that they will choose the route of multi-lateral trade rather than protectionism. The U.S. cannot be a member of a regional economic bloc. Access to the U.S. market can be the link holding the free world economy together in a period of intense Communist rivalry. •

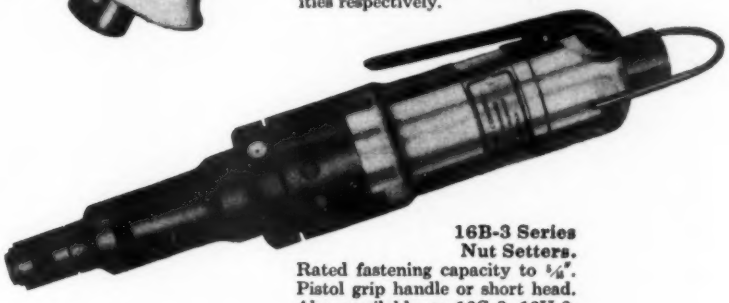
This report summarizes a statement by the Research and Policy Committee of the 180-member Committee for Economic Development. Copies of the complete statement are available from CED, 711 Fifth Ave., New York 22.

Industry Briefs

Home appliance manufacturers, both gas and electrical, reported a general decrease in shipments of units during the 1960 nine month period. The only items which showed a modest increase over the similar 1959 period were electric dishwashers, built in gas ranges, gas fired duct furnaces and gas fired incinerators. •

DRILL ...SET... DRIVE

11B-3 Series Air Drills. Powerful and lightweight for continuous duty. Rated to 3/8" capacity. Pistol grip or offset handle, or short head. Also available as 11G-3 and 11HA-3 Series Angle Drills. 1/4" and 3/8" rated capacities respectively.



16B-3 Series Nut Setters. Rated fastening capacity to 1/4". Pistol grip handle or short head. Also available as 16G-3, 16H-3, 16HA-3 Series Angle Nut Setters. Wide range of attachments permits almost unlimited applications to 3/8" nominal capacity. Straight handle or short head.

12B-3 Series Screw Drivers. Nominal fastening capacity to 1/4". Pistol grip, offset handle, or short head. Also available as 12G-3 Angle Screw Drivers; 3/8" rated capacity; straight handle or short head.

faster than ever before with NEW Gardner-Denver no. 3 series air tools

Here's a new line of air tools designed to keep any production line stepping faster than you've ever known. Drills, screw drivers, nut setters—in-line and angle types—are available with a complete selection of interchangeable attachments.

New, powerful air motor gives better performance with less noise than ever before. Motors used in the entire series are identical—permitting the wide range of versatility, adaptability and interchangeability.

Further versatility. All attachments used on the Series 2 basic motor unit are also adaptable to the new Series 3 basic motor unit—adding even greater flexibility to Gardner-Denver's complete line of air tools.

Get all the facts on this No. 3 series—the line designed with production in mind. See your Gardner-Denver air tool specialist or write for bulletins.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

Use postpaid card. Circle No. 210

FOR LAUNCHING SALES SATELLITES STANDARDIZE 100% ON SOUTHERN FASTENERS

If you're making sales plans for a new model or new product soon to be launched into orbit, Southern fasteners will help assure its success.

Southern specializes in the manufacture of standard fasteners. Top quality materials and workmanship are combined to produce the most dependable production fastener your money can buy. Burr-free heads and durable threads help step up driving speed in assembly, and thus costly down-time, rejects and injured materials are reduced.

Order USA-made Southern fasteners today. Call your nearest Southern distributor, or write direct to factory: Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock in Statesville, North Carolina. Warehouses: New York • Chicago • Dallas • Los Angeles.

Southern SCREW COMPANY STATESVILLE • NORTH CAROLINA

Machine Screws & Nuts • Tapping Screws • Stove Bolts • Drive Screws • Carriage Bolts • Continuous Threaded Studs • Wood Screws

Use postpaid card. Circle No. 211

Industry at Work

ELECTRONIC SCANNER MASTERMINDS SPOT WELDING ON CHRYSLER ASSEMBLY LINE

An electronic scanning pulse traveling from one machine to another at a rate of 120 millionths of a second is masterminding the welding operations at the Chrysler Corporation's stamping plant at Twinsburg, Ohio.

It is an electronic scanner—the only one of its kind in the world—and it automatically searches, controls, regulates, times and keeps a record on a 658-foot automatic welding assembly line, largest in the automotive industry.

It is called the Magic Wand and it ensures that all unit bodies are solid, metal-fused integral units. This electronic brain scans 24 electrical welding units at an almost unbelievable speed—320 times every second it asks each welding machine: "Are you ready to weld?"

When it gets the okay signal, it permits individual firing of the 24 units so fast that the human eye cannot detect the intervals. In this way, more than 860 spot welds are created to form the rails and the floor pan assembly of almost all the corporation cars.

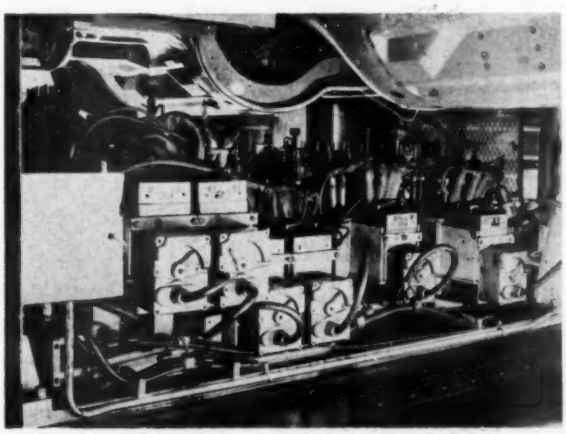
The scanner was a necessary adjunct to the automated assembly line because the welding operations required such tremendous amounts of electrical power that two giant welders fired simultaneously would seriously affect weld quality due to excessive voltage drop.

This electronic brain controls the firing in millisecond intervals to all the machines and no two fire at the same time. It directs the use of 90,000 kilovolt amperes of energy, which is the electrical demand of all 24 machines. This is equal to 45,000,000 watts of electricity. And this amount of energy equals 60,000 horsepower or the power supplied by 570 Valiant cars at wide open throttle.

There is always a certain amount of inherent slowness in an automated assembly line and certain machines react quicker than others. But the Magic Wand is an impatient scanner. If a given machine

continued

The ladder assembly on the left is traveling toward the "marriage" ceremony with the floor skins on the right.



Welding machine taken a split second before the floor pan is raised up to the nozzles on the automated assembly line at Twinsburg.

GILLEN

Eliminate expensive machining and fitting with

NEW GILLEN
Hardened Spring Steel
TENSION BUSHES

Self-Seating • Self-Fitting
Long Wearing • Economical

STRAIGHT SLOT

ARROW SLOT

SLANTED SLOT

Internal or External Types
Many lengths and diameters.
Chamfered for
Quick and Easy Insertion.

Write for complete information

JOHN GILLEN COMPANY
subsidiary of
STANRAY CORPORATION
2558 South 50th Avenue
Cicero 50, Illinois

EVERY TYPE OF KEYING AND PINNING DEVICE FOR PRODUCTION ASSEMBLING
PIVOTS • BUSHES • TENSION, TAPER, GROOVE & DOWEL PINS • MACHINE KEYS & PARTS

GILLEN

Use postpaid card. Circle No. 212

fails to fire and send in a "finish" signal within a three-second interval, the scanner turns on a red warning light and moves on to fire other welding machines. If any portion of the automated line cannot be repaired in a few minutes, the entire assembly operation is shifted to a duplicate assembly line with the same number of welding machines and the same electronic brain to command it.

These lines work so smoothly that more than 2000 complete rail and floor pan assemblies can be turned out in one eight-hour period. A change in the shape of the assembly can be arranged in 20 minutes. Seven different car pan shapes can be handled by the line and new car configurations can be adapted to the line in one shift.

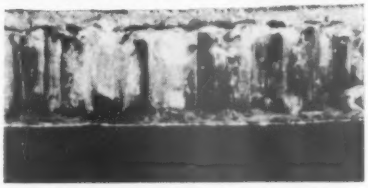
Manufacturing engineers point out that the use of the electronic scanner makes sure that every welding machine receives the same charge of electricity each time it welds, thereby assuring consistent quality in the welding operation.

BOEING CHALLENGED BY SPIKE HEELS, REDESIGNS 707 FLOORS

Boeing is besting a new flight problem not covered in engineering manuals. It's the problem posed by the latest feminine style of spike heels. Recovery is being made via a new floor for 707 jetliners.

Fashion took the first round as each ¼" heel on the shoe of a 110-lb. female develops an impact in excess of its 2240 lbs. psi steady load pressure.

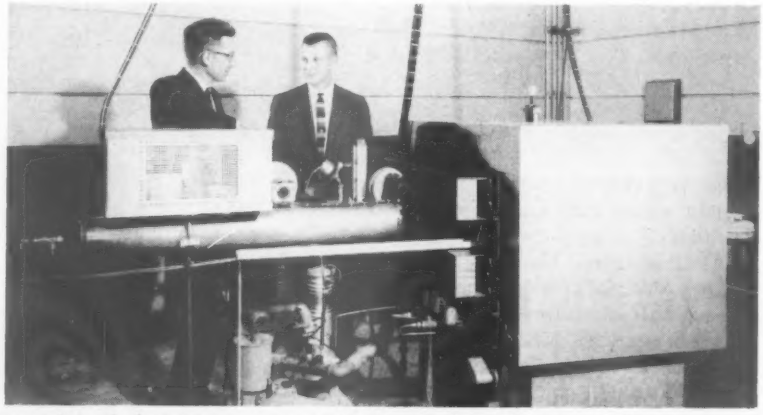
The traditional aluminum honeycomb floor panels had withstood streams of pedestrian traffic. Along came the new style and soon the jabs were breaking down the edges of the honeycomb cells just below the contact surface and punching dimples into the panel's upper surface.



Section of floor panel shows how cells of aluminum honeycomb sandwich core crumble under bombardment of spike heels worn by feminine passengers.

As a result of a testing program, floor panels of corrugated aluminum sheets spotwelded to upper surface skins will replace the honeycomb sandwich panels.

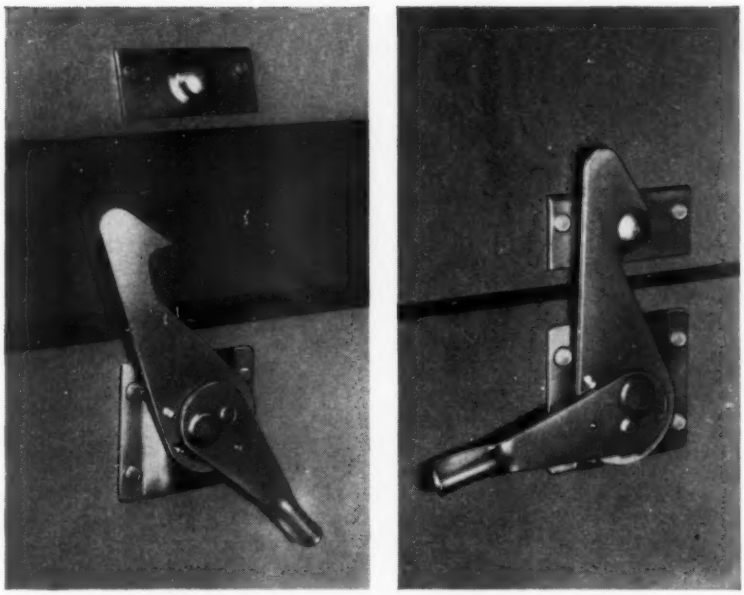
The new corrugated panels were selected after testing more than 50 combinations of flooring, carpeting and insulation. Designers say they should last about eight times as long as the honeycomb panels.



Dr. J. W. Clark (left), manager of Hughes nuclear electronics laboratory, and Dr. E. M. Fryer of the Pomona College physics department discuss the first cyclotron built primarily as a teaching tool. Vacuum pumps, control valves and a five-foot coaxial feed line for supplying acceleration energy make up the cyclotron's "plumbing". An iron-block electromagnet mounted on concrete supports at right contains semi-circular vacuum tanks in which positively charged particles are accelerated.

WHAT HOOK-LOCK IS

HOOK-LOCK is a springless, positive-locking latching device which is ideally suited for use on rigidly specified military transit cases as well as less expensive commercial containers. It provides high closing pressure and tremendous load-carrying capacity...is impact and shock-proof. HOOK-LOCK is so designed that it lies flat against the mounting surface whether in open or closed position. Since operation is parallel to mounting surface, no space for operating clearance is required.

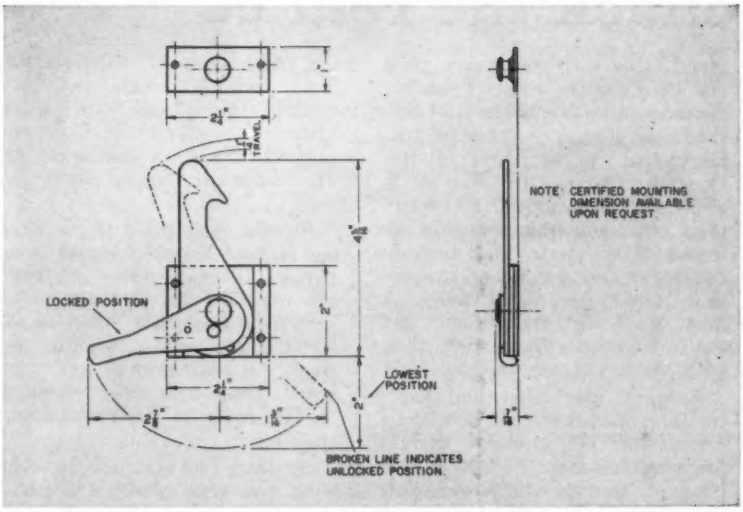


HOOK-LOCK lies flat against mounting surface, open or closed.

New—HOOK-LOCK container latch...It's flat!

FEATURES

- Shock-proof—solid construction...withstands high impact blows *directly on the fastener.*
- Closing pressure of 200 lb. Where needed, pull-down pressure can be substantially increased by modification of operating lever.
- Tensile load capacity: 750 lb.
- Compact—lies flat open or closed. Extends just 7/16" from container surface at thickest point.
- Positive-locking and springless. Unaffected by arctic temperatures.
- No operating clearance required, because hook and lever move parallel to mounting surface.



IF YOU have questions regarding the possible application of HOOK-LOCK or other Simmons industrial fasteners to your particular needs, your inquiry will receive our immediate attention. Contact your nearest Simmons office or write direct.

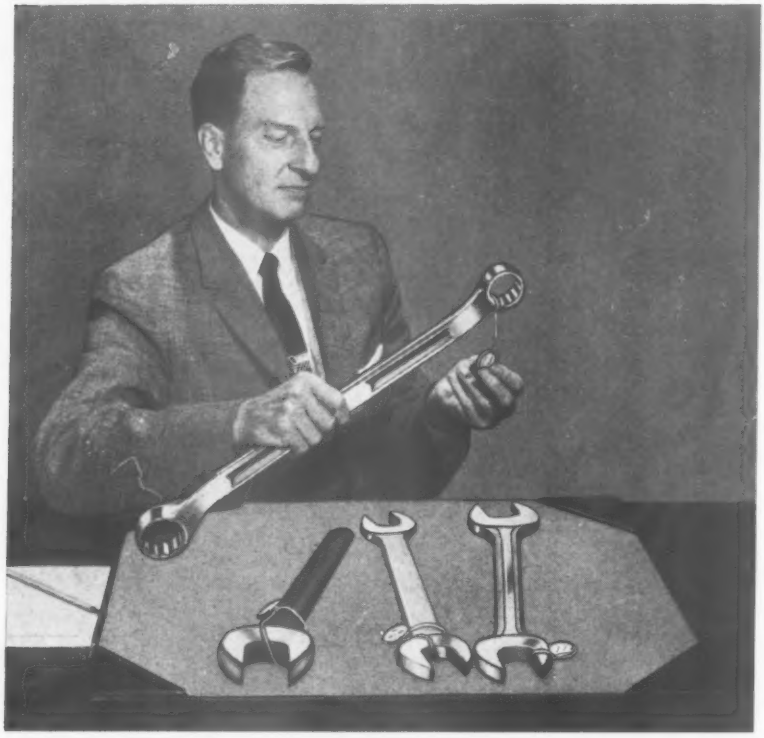
SIMMONS FASTENER CORPORATION

1796 North Broadway, Albany 1, New York

See our 8-page catalog in Sweet's Product Design File

Use postpaid card. Circle No. 213

In industrial wrenches...



check the price tag— check the real cost, too!

Hand tools with the lowest price tag often are the most expensive. Before you buy, consider tool life, speed of delivery, vendor's tool knowledge, worker productivity. Consider tool quality and all it implies. For example, SNAP-ON® tools are made from specially selected alloy steels that provide toughness and durability—factors that permit lightweight design. A man can work faster, easier, get more done with these tools than with clumsy heavyweights.

Forging, machining and heat-treating operations are precision-controlled. A SNAP-ON wrench fits snugly, surely — lets a man pour on the muscle power with confidence. SNAP-ON tools cost less in the long run. They stay on the job long after price-line merchandise hits the junk heap.

Delivery speed is important, too, particularly on assembly line tools. SNAP-ON maintains fully stocked regional and branch warehouses throughout the U.S. and Canada. SNAP-ON customers get immediate attention on emergency calls.

Finally, you can't put a price tag on tool knowledge and experience. SNAP-ON sales engineers are qualified to give advice on proper tool selection, plan decentralized tool cribs, analyze tool needs for maintenance and overhaul. They also refer ideas on special tools to SNAP-ON design engineers.

By every tool measure, SNAP-ON gives you your money's worth — and then some. Your nearest SNAP-ON representative would welcome the opportunity to prove this. Call him or write us now for new 180-page industrial catalog.

FOR ALL INDUSTRY

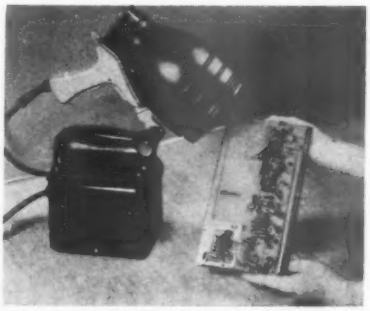
SNAP-ON TOOLS

8033-L 28th AVENUE • KENOSHA, WISCONSIN

Use postpaid card. Circle No. 214

BLACK LIGHT INSPECTS PRINTED CIRCUIT BOARDS

Black light inspection detects hydrocarbons on Lox service parts, residual flux on printed circuit boards, soaps and detergents on gear trains, hydraulic leaks, non-uniformity of potting compound, fungicidal varnish and lacquer coatings, plastic particles in servo and gyro mechanisms, fluorinated hydrocarbons on wiring harnesses, reveals invisible inks for quality control coding, etc.



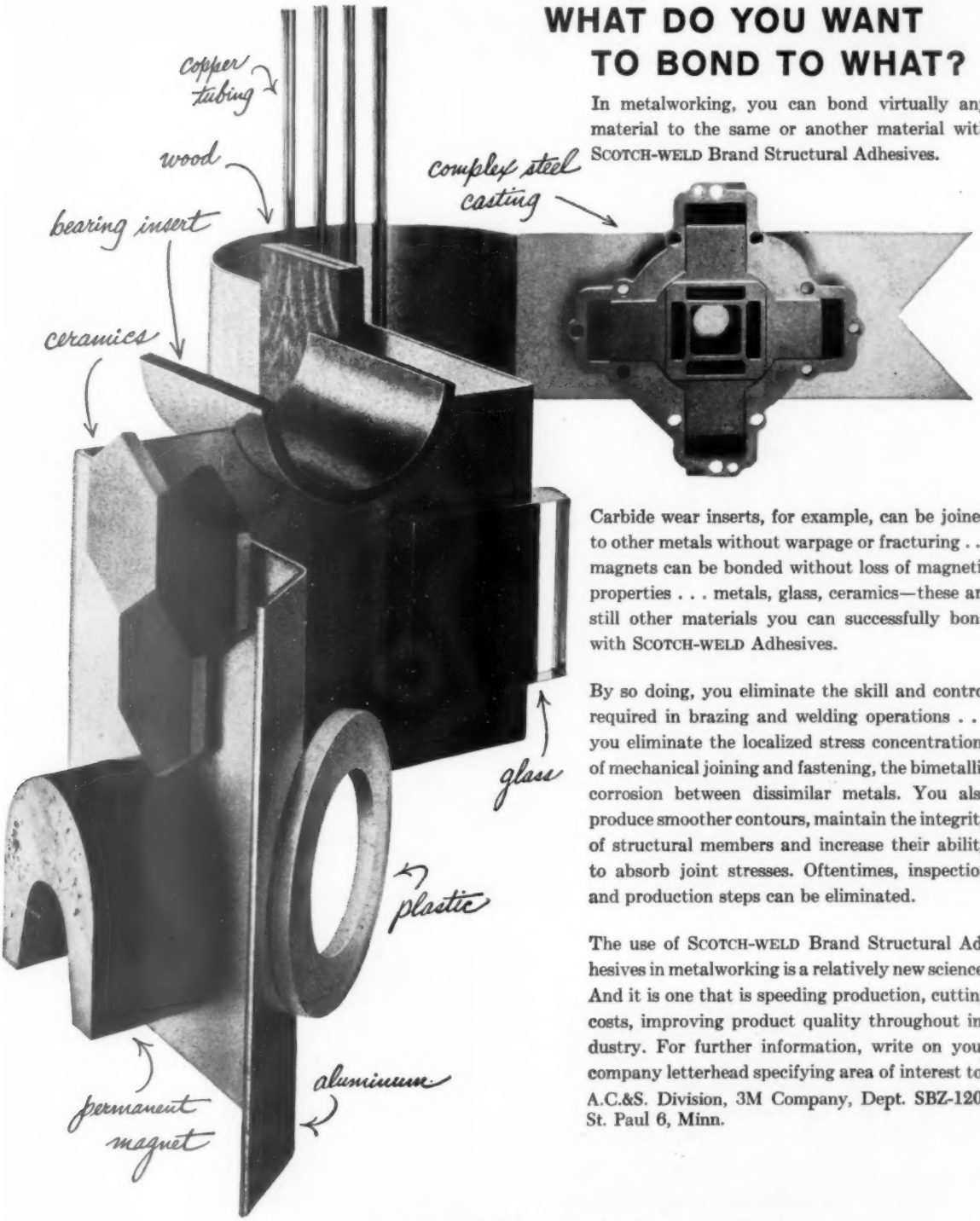
A black light lamp made by Ultra-Violet Products, Inc., San Gabriel, Calif. detects residual flux on printed circuit boards.

Minute traces of fluorescent contaminants, invisible to the naked eye and the microscope, are spotlighted by black light against the background of non-fluorescent material, enabling inspection personnel to process parts as much as four times faster and more accurately than with conventional inspection procedures.

Black light is that ultra-violet radiation just beyond visible violet light. The principal radiation involved is at 3660 a.u. This wave length is harmless to the skin and eyes.

NAIL HEADING MACHINE MAKES TURKEY SKEWERS

Special aluminum three-inch skewers made at Aluminum Company of America's Lancaster plant used over 2,300 miles of aluminum wire. Shot out of an ordinary nail heading machine at the rate of 1,000 per minute, they were part of a pre-Thanksgiving promotional give-away by Procter and Gamble. •



WHAT DO YOU WANT TO BOND TO WHAT?

In metalworking, you can bond virtually any material to the same or another material with SCOTCH-WELD Brand Structural Adhesives.

Carbide wear inserts, for example, can be joined to other metals without warpage or fracturing . . . magnets can be bonded without loss of magnetic properties . . . metals, glass, ceramics—these are still other materials you can successfully bond with SCOTCH-WELD Adhesives.

By so doing, you eliminate the skill and control required in brazing and welding operations . . . you eliminate the localized stress concentrations of mechanical joining and fastening, the bimetallic corrosion between dissimilar metals. You also produce smoother contours, maintain the integrity of structural members and increase their ability to absorb joint stresses. Oftentimes, inspection and production steps can be eliminated.

The use of SCOTCH-WELD Brand Structural Adhesives in metalworking is a relatively new science. And it is one that is speeding production, cutting costs, improving product quality throughout industry. For further information, write on your company letterhead specifying area of interest to: A.C.&S. Division, 3M Company, Dept. SBZ-120, St. Paul 6, Minn.

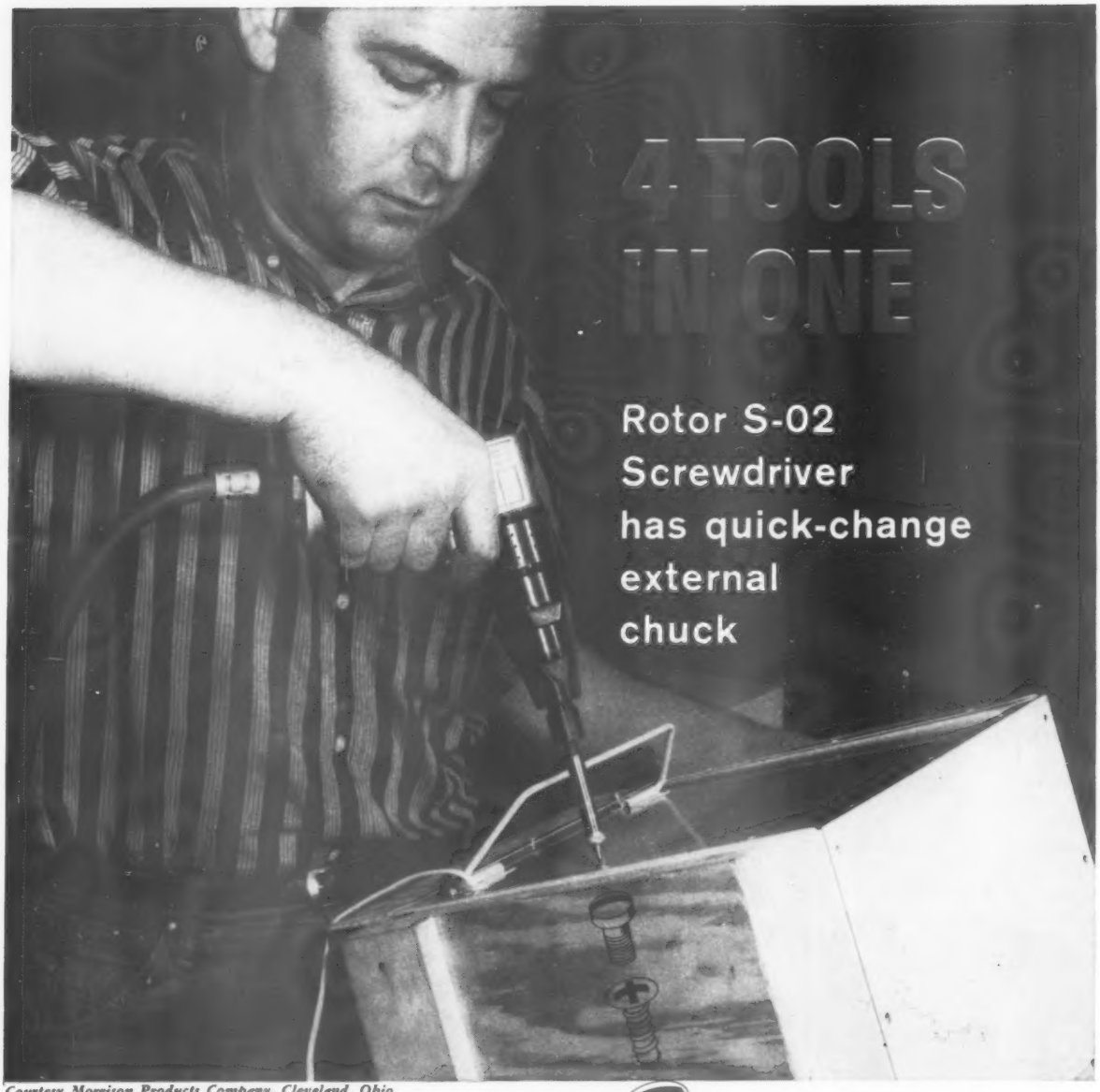
ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Use postpaid card. Circle No. 215



Courtesy Morrison Products Company, Cleveland, Ohio

JOB: Assembly of portable room air purifier—driving screws, bolts and nuts. Would normally require four different tools.

RESULTS: The *right tool for the job* here is the Rotor S-02PP Screwdriver with ¼" external chuck. At *one-fourth the tooling cost* this 900 rpm air tool gives quick change from any type screw heads—to bolts—to nuts. Operator just snaps in the right drive accessory to fit the job. All work is done at one station. Saves handling time. Cuts operator fatigue.

Ask for a demonstration of Rotor portable tools to see how they can cut *your* costs.

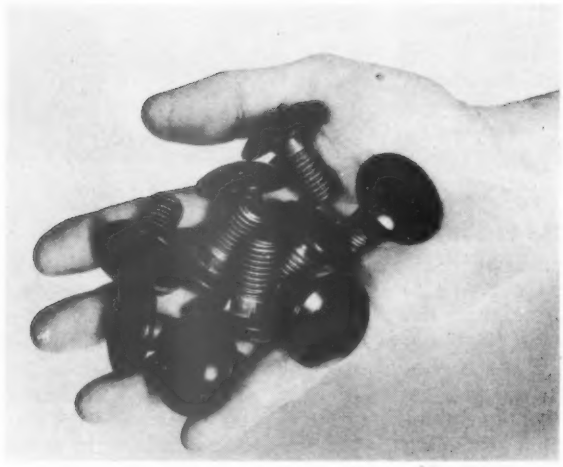
Write for full-line Bulletin 53-C.

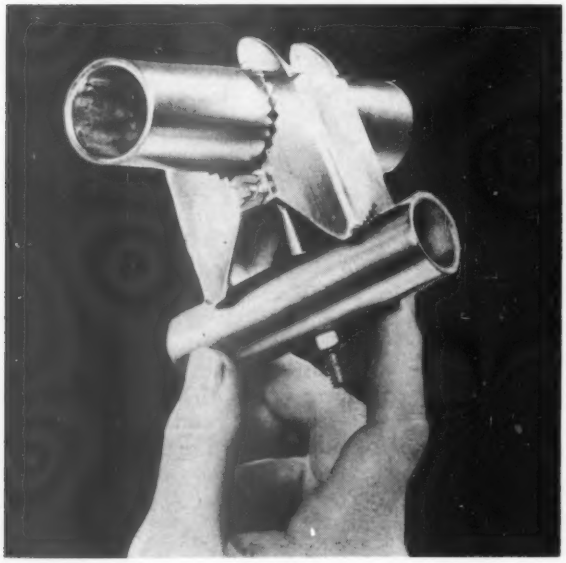
ROTOR TOOLS®
The Rotor Tool Company · Cleveland, Ohio
SUBSIDIARY OF THE COOPER-BESSEMER CORPORATION

ROTOR AIR TOOLS: Assembly Tools · Drills · Small Wheel Grinders · Straight Grinders · Vertical Grinders · Scalers Chippers · Rammers · Special Tools · Air Motors · ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders · Polishers · Sanders

Use postpaid card. Circle No. 216

Assembly and Fastening Ideas





PLASTIC-CAPPED BOLTS RESIST CORROSION

Bolts are being capped with a durable and corrosion-resistant plastic to extend their usable life under high-rust or chemically-corrosive conditions. The capping method was developed by Clear-Cite Products of Chicago while searching for a way to cut basic costs of huge glass-lined steel silos made by A. O. Smith Corp. Each silo was formerly held together by 5000 stainless steel-topped bolts.

When an attempt was made to use plastic in place of stainless steel, the first plastics failed because the thin plastic layer molded over the bolt head was squeezed off the underside of the head when it was tightened with the 30 pounds of torque required in silo building.

This "squeezing" problem was solved when Clear-Cite tried Kralastic MM, a new ABS plastic. This resin-rubber plastic is designed to resist cold flow under loads. Although just a fraction of an inch of this plastic is molded in a layer over the bolt head, it proved strong enough to resist the high torque squeezing action.

CLAMP HOLDS TWO TUBES AT RIGHT ANGLES

A simple fastening device is capable of holding two pipes or tubes of different diameters firmly together at right angles. Hunter Spring Company, the designers, reports that the clamp adjusts to the pipe diameter in any given application, such as a TV receiver antenna, pipe hanger, or light temporary or permanent pipe structure.

The clamp requires only one manual adjustment to grasp two tubes or pipes of different diameters and grip both tightly together at right angles. In the model illustrated, a threaded bolt is passed through one pipe and drawn up. Tightening the nut causes the clamp's jaws to tighten on both pipes at once. This particular model requires perforation of one of the pipes for the bolt. In other models, a

continued

General Vibrex
MULTI-FUNCTION
FASTENERS

The versatile half-turn fasteners combine the advantages of a quick acting panel lock with those of an elastic shock isolator.

- *Damp noise*
- *Eliminate rattles*
- *Simplify assembly*
- *Correct Alignment*
- *Absorb shock, vibration*

The Vibrex Fastener locks by means of an expanding, waterproof and dustproof sleeve of especially compounded rubber. This forms an elastic suspension which actually floats the panel-base assembly in live resilient rubber.

Call your Avnet Applications Engineer

For dependable service

and immediate delivery*

AVNET

*AVNET•70 State St., Westbury, N.Y. -ED 3-5800
AVNET•5077 Redeo Rd., Los Angeles 16, Cal.-UP 0-8141
AVNET•45 Winn St., Burlington, Mass., BR 2-3060
AVNET•4100 Kettering Blvd., Dayton 39, Ohio-AX 0-1458
AVNET•2728 N. Mannheim Rd., Melrose Park, Ill.-GL 5-0160
AVNET•1262 N. Lawrence Sta. Rd., Sunnyvale, Cal. -RE 6-0300

Use postpaid card. Circle No. 217

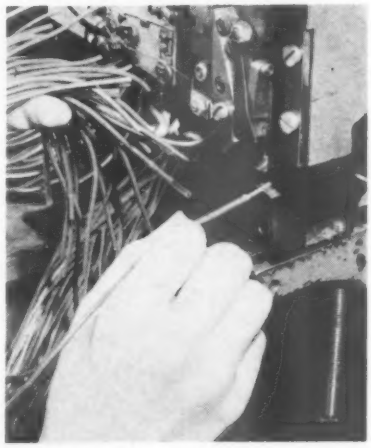
different type of engagement is provided to eliminate the need for holes in pipes carrying fluid.

Additional applications include: temporary plumbing, light scaffolding, experimental fixtures, drapery rails, temporary hand rails, barriers, sign boards, area partitions, clothing racks, fence nails, electrical ground connections, drying racks, display racks, bicycle accessories, fasteners, tent frames, and hangers for lighting and photographic equipment.

CABLE MARKERS SAVE 500 MAN-HOURS INSTALLATION TIME

"We saved an estimated 500 installation man-hours in coding 200 process control panels with Beta-Z cable marking devices," said E. L. Wolfe, Jr., vice president of the Wolfe & Mann Mfg. Co. Over 100,000 of these one-piece, flexible sleeves with an accordian-type pleat were used on the project. They allow easy installation and positive gripping.

The markers, made by Electrovert Inc., are for small cables or wire bundles (.110″ to .460″). Sizes and diameters are coded to correspond with AWG size designations. A flat PVC marker measuring ⅜″ by 9/16″ containing insert holes for the strap is used for coding.



ADHESIVE AIDS ELECTRONIC DESIGN MINIATURIZATION

That miniaturization of electronic circuits is not confined to satellites is demonstrated at the Elmsford, N.Y., plant of the Sonotone Corporation. Take Sonotone's Model 66 hearing aid, for instance. This 153-component instrument is capable of providing a high degree of undistorted speech reproduction with an amplification of 10,000 times the input sound intensity, yet it is no bigger than a lump of sugar and weighs no more than a 50¢ piece including its tiny battery.

Tiny neoprene suspension pads are bonded to the interior microphone. The adhesive is first applied by hand to the four corners of the microphone structure. This is then placed in the jig shown in the background, where four neoprene tabs are automatically pressed into place.

In more than a dozen points in the assembly of the instrument Eastman 910 adhesive is used. A tiny metal adapter plate is bonded to a cellular rubber gasket which, in turn, is bonded to the metal grille on the earphone. This provides a flexible suspension of the earphone to the housing. The adhesive is also used to position both the microphone and receiver assemblies within separate brass cups. The microphone is then suspended from the inside of a mu-metal magnetic shield by three rubber tabs measuring as small as .045″ in width, thus isolating the microphone from external vibrations. Here a tiny drop of the adhesive is applied to each end of each tab. Finally, a rubber duct is bonded to an opening in the housing and to one in the microphone grille.

An important part of this miniaturization program has been a search for suitable adhesives. Some adhesives had exhibited tendencies to "string out" or "ball" during application. The Eastman product—a thin, clear

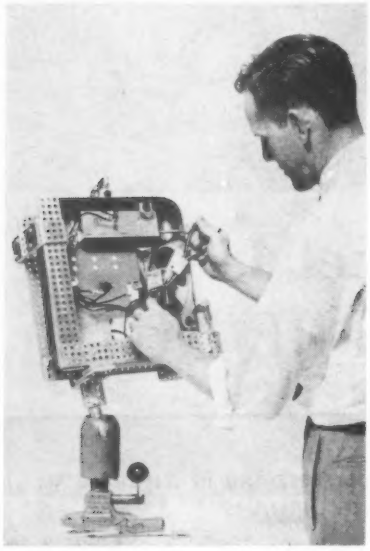
continued

liquid, compounded principally of a cyanoacrylate monomer—flows smoothly into tiny spaces and sets within seconds with only contact pressure.

HUGHES FINDS NEW USE FOR WORK POSITIONERS

A new application for ball-and-socket work positioners has been found in the electronics field. These work holders, called PowR-arms, are a product of Wilton Tool Mfg. Co., Schiller Park, Ill.

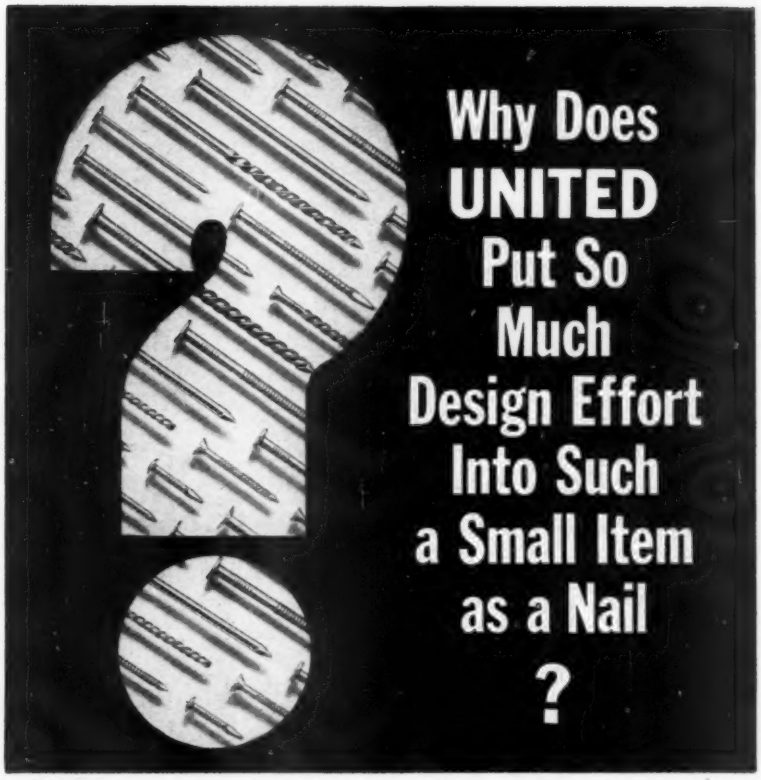
This new application was noted by Alex Vogl, Wilton president during a visit to the electronics plant of Hughes Aircraft Co., El Segundo, Calif. He found that Hughes engineers had mounted perforated arms and toggle clamps on the work positioners so as to support electronic chassis during assembly.



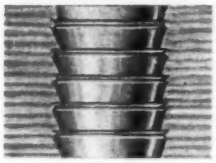
The positioners are incorporated in the total work environment station developed by Hughes to permit individual workers to assemble complete electronics units.

In this application, perforated arms, made of ¼" thick flat strips of aluminum plate, 18" long are large enough to embrace the largest electronic chassis.

A report of this new assembly system is covered in last month's cover story, "Will Audio-Visual Systems Obsolete Assembly Lines?" •

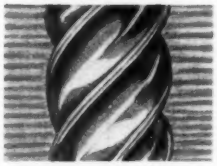


Annular Thread Action



As nail is driven, sharp, deep, clean, well formed annular threads lock with wood fibers which wedge into deep grooves between thread crests. Holding power can increase as wood seasons. Best for soft and medium woods.

Spiral Thread Action



Spiral thread has sharp crests, deep roots, correct lead angle. Turning as it is driven, nail cuts thread with minimum wood fiber disturbance. Resists tendency to loosen or back out. Best suited for hard woods. Usually in end grain.

Appropriate question. Especially since nails are often considered "just another" way of fastening.

Here's the answer. United designs POWASERT® Machine Quality Nails to do a specific fastening job for a specific job application. Nails include specialty, pallet, common, box and sinker.

POWASERT Machine Quality Nails are designed to run smoothly and efficiently in automatic nailing machines; without jamming and without damaging or marring the surfaces being joined.

What's more, POWASERT Machine Quality Nails provide the head (8 types), the shank (4 types), the point (4 types), the metal (8 types), and the finishes (10 types) to assure the best joint possible in assembled products.

The result of this penchant for nailing performance? Maximum holding power in applications ranging from furniture to sheet steel, from plank roofing to truss plates — with dozens of "wood-be" uses in between.

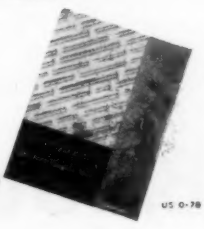
Why don't you investigate POWASERT Machine Quality Nails for your fastening operations? They are designed for machine operation, and when used in combination with POWASERT Automatic Nailing Equipment, they'll put you dollars and hours ahead.

A United expert in "nailology" will demonstrate new ways you can use nails and automatic nailing equipment now — and in the future. Also, you'll want a copy of the POWASERT Nail brochure. Call or write: United Shoe Machinery Corp., 140 Federal Street, Boston, Mass.

Fastening Advances Automatically Yours With...

United

POWASERT®



US 0-78

Use postpaid card. Circle No. 218

Plastic fastened to metal— firm and weather-tight with RIVNUTS®

Large transparent plastic panels form the cockpit windows of the Vertol Aircraft Company's new YHC-1A helicopter. The plastic is firmly secured to the airframe by B. F. Goodrich RIVNUTS. About 300 are installed—quickly and easily—resulting in a finished seal that withstands both vibration and weather extremes.

One man fits the RIVNUTS into the hat section, working from one side. These RIVNUTS act as blind nutplates. Attachment screws tighten the molding strips, rubber and plastic in a firm, weatherproof grip.

This use of blind-fastening RIVNUTS insures a simple and very satisfactory method of window installation. In case after case, RIVNUTS speed assembly, cut labor costs, simplify design. If you'd like recommendations on a specific fastening problem, please send a print of your part.

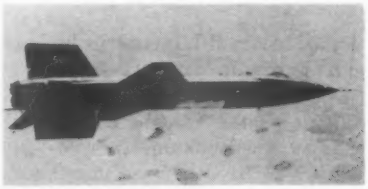
YOU CAN IMPROVE FASTENING IN SHEET METAL, TUBING, TANKS WITH RIVNUTS

New RIVNUT Data Book visualizes how RIVNUTS work, shows construction and ease of installation in many forms or types of materials. For free copy write Dept. AE-12, *B.F.Goodrich Aviation Products, a division of The B.F. Goodrich Company, Akron, O.*

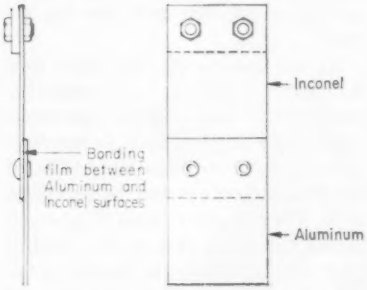
B.F.Goodrich *aviation products*

Use postpaid card. Circle No. 219

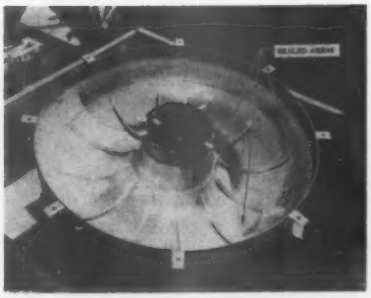
THERMOSETTING FILM ADHESIVE SOLVES SEALING PROBLEMS ON X-15 ROCKET



North American Aviation X-15 research rocket aircraft in flight.



Test specimen used to determine most efficient sealer for liquid ammonia tank pressure bulkhead.



Pressure bulkhead of X-15 liquid ammonia tank sealed with structural film adhesive AF-30.

One of the many problems faced by the designers of the North American Aviation X-15 research rocket aircraft was that of adequate sealing. Sealants used had to be chemically resistant to a variety of fluids and capable of maintaining effective seals at a wide range of temperatures and pressures.

One problem is sealing the segmented pressure bulkheads of the liquid ammonia tank, consisting of Inconel riveted to 7075-T6 aluminum. The seal must resist the effects of ammonia for extensive periods and remain serviceable from −40°F to plus 300°F. In addition, the sealer must be capable of being applied and cured at a temperature which will not destroy or reduce the strength of the aluminum because of time-temperature annealing effects.

A variety of sealants were tested by North American. Successful sealing was accomplished only with 3M's Scotch-Weld structural adhesive film AF-30. In addition to providing an effective seal, AF-30 provides added strength to the joint.

Sealing starts by applying a thin, even coat of primer to all areas to be sealed. While the primer is still tacky, adhesive is positioned on the Inconel surface.

The film adheres to the primed surface and can be formed to fit most contour sections. In areas where the film cannot be formed to match the contour of the part, ¼" deep V-shaped cuts are made in the wedge-shaped pieces of bonding film. The wedges are held in position with the primer until the mating part is brought into place. Large structural holes are plug-sealed with hand-formed pieces of adhesive.

To remove any film adhesive covering fastener holes, an Osborne revolving punch is used. The hole in the film adhesive is undercut to leave a .005" to .010" overlap extending into the hole so that the film adhesive will flow along the sides of the inserted fastener, thus completely sealing the fastener.

After a leakage check, the adhesive is cured at 300°F to 350°F for two hours. Then all bolts are retorqued.

STAINLESS PROPERTIES IN CARBON STEEL FASTENERS

Miniature carbon steel fasteners can now have some of the properties of stainless steel with a chromium diffusion process called Alphatizing, developed by Alloy Surfaces Co., Wilmington, Del. The parts will have increased resistance to corrosion, wear and heat.

Arthur J. Seiler, president, states; "Alphaloy supplies an adequate and controllable amount of chromium to the metal surface, eliminating factors that in the past contributed to unpredictable results".

An Alphatized case becomes an integral part of the metal, pinholes are not formed. Even small surface imperfections are penetrated and treated.

Offering a variety of applica-

continued

this is your

DOWEL PIN

check list

Frankly, these characteristics are standard with Acme Dowel Pins. If all 5 are not standard with your dowel pin source, obviously, your operation deserves further Acme information; in all probability, Acme pins.

1 PRECISION Hardened and ground to .0002" or .001" over nominal diameter. Also available: oversized .002", .003", .004", .005".

2 HARDENED Case hardened to 60-62 Rockwell "C" scale.

3 SIZES 132 standard, 3/8" to 6" lengths, 1/8" to 1" diameters. Special on request.

4 SAFETY Breaks before bending or mushrooming, no misalignments or major damage.

5 SPEED No faster delivery, no more reliable source or brand.

Send in this coupon today!

ACME INDUSTRIAL COMPANY
200 North Laflin Street, Chicago 7, Illinois

☐ Send the complete Acme Dowel Pin brochure and price list.

☐ Have your representative call.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

Use postpaid card. Circle No. 220

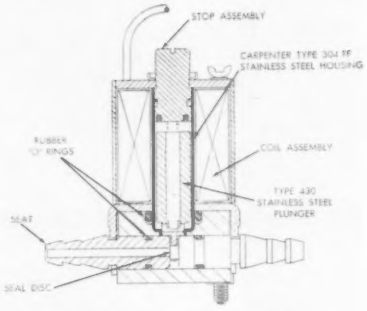
tions, ranging from minute fasteners to parts for the atomic energy industries, typical applications include jet engine vanes, communication relay parts and can seamer rollers.

TUBING STEEL, ASSEMBLY METHODS LENGTHEN VALVE'S LIFE

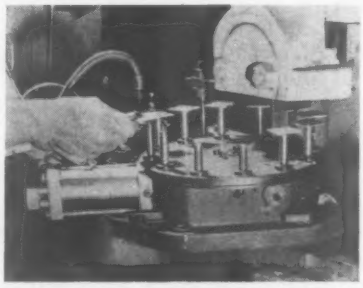
In its search for a suitable material to serve as the plunger housing for a solenoid fuel valve, Valcor Engineering Corp., Kenilworth, N.J., had a narrow field from which to choose.

The material had to be tubing, light-weight yet strong, easy to machine, non-magnetic, resistant to abrasion and corrosive fluids. Valcor settled on Carpenter Type 304 full finished welded stainless steel tubing. In 10 years, Valcor has had no reports of tubing failure in its products.

The significance of this record becomes more apparent when you consider the conditions under which these valves operate. In a direct action valve, for example, the plunger may be actuated up to 3000 strokes a minute.



A typical Valcor solenoid fuel valve.



Top plate is semi-automatically assembled to complete the tube assembly.

At the same time, the tubing is able to resist the corrosive action of media fluids such as hydrogen peroxide and JP-4 missile fuels. Temperatures in which the valve operates range from -350°F —as in the Redstone missile—up to 500°F in other military and commercial applications.

In fabricating the housing, the tubing is first cut to size and the inside edges chamfered. Then the outside of one end is polished to permit a smooth seal for an O-ring.

In the next step, the tube end is heliarc welded to a stainless steel plug. This ticklish operation could be a trouble spot in production. But Valcor has been able to hold the rejection rate to less than .5%. Then a base plate is pressed on to the plug end of the tubing and the assembly is ready to be assembled with other components of the valve.

DIE CAST PIN RECEPTACLES CUT COSTS FOR NATIONAL CASH

To meet the requirements of complex shape, close tolerances, and low cost, many users of taper pin connectors have turned to Gries Reproducer Corporation's automatic die casting technique. An unusual variation of these designs has been incorporated in multiple taper pin receptacles for National Cash Register's punched tape recorder. Die cast in groups of four double receptacles, the parts are insert-molded into plastic terminal boards, which then receive taper pins from either side.

The most common wiring scheme calls for double receptacles in multiples of four, and the parts are used as die cast. When other combinations are required, the receptacles are broken apart to furnish the correct multiple.

To facilitate this practice, the receptacle groups are die cast

continued

How SHAKEPROOF Protects Your Product's Reputation

Here is the answer to one of industry's toughest problems . . . how to reduce costly inspection rejects and avoid customer complaints due to fastening failure.

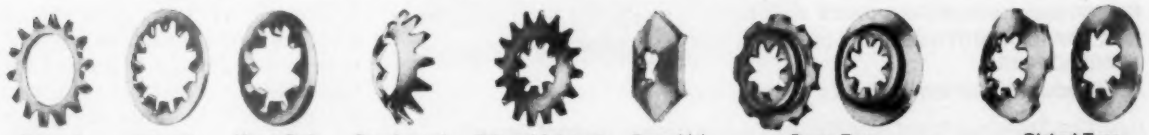
Shakeproof engineers have gathered formidable evidence that only one washer locks . . . where others fail! Their findings, just published in the booklet offered at the right, prove that "weight and thickness" don't lock a fastener, and that "spring action" alone isn't locking action.

They have conducted tests with various types of washers commonly used for protection against failure caused by handling and operational vibration. Results show that only Shakeproof Lock Washers retained 100% relative locking efficiency.

Be sure to protect your product's performance and reputation with the one top-quality, top-performance lock washer . . . Specify SHAKEPROOF . . . the *original* toothed lock washer!

Send for this Free Booklet Today—it is filled with factual test data and actual case histories which show how you can be sure of quality at every step in the assembly of your product.

STANDARD SHAKEPROOF LOCK WASHERS INCLUDE:



External Type | Internal Type | Heavy Duty Internal Type | Countersunk Type | External-Internal Type | Pyramidal Type | Dome Type Toothed or Plain Periphery | Dished Type Toothed or Plain Periphery

SHAKEPROOF *"Fastening Headquarters"®*

DIVISION OF ILLINOIS TOOL WORKS St. Charles Road, Elgin, Illinois

In Canada: SHAKEPROOF/PASTEX Division of Canada Illinois Tools Limited, 67 Scarsdale Road, Don Mills, Ontario

LOOK TO SHAKEPROOF—THE LEADER IN FASTENING

Use postpaid card. Circle No. 221

This New Lightweight Miniature Power Tool

- installs *Heli-Coil* Screw Thread Inserts, both Standard and Screw-Lock, in sizes 4-40 through 8-32.
- permits quick and easy size changes.
- is easy to use in restricted areas and miniaturized products.
- operates from remote motor with flexible shaft.
- is provided with automatic clutch and precision depth adjustment.
- speeds production and cuts costs.

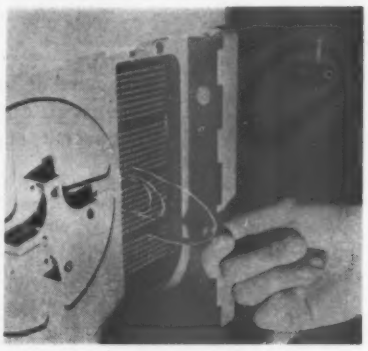
Heli-Coil Stainless Steel Wire Screw Thread Inserts protect threads permanently against wear, corrosion, stripping, galling, and seizing.

Write for Bulletin 770A with complete information about this new *Heli-Coil* Power Tool.

HELI-COIL CORPORATION
3112 Shelter Rock Lane, Danbury, Connecticut
In Canada: ARMSTRONG BEVERLEY ENGINEERING LTD.
6975 Jeanne Mance St., Montreal 15, Que.

2864

Use postpaid card. Circle No. 222



Assembler at National Cash Register inserts taper pins into terminal board of punched tape recorder.

with predetermined breaking points. These "break-aparts"—with section thickness only .006"—are located in the connecting strip between the cylinders and close to the cylinder wall so that a clean separation can be obtained. The process not only reduces inventory and cuts part handling but it also reduces assembly time.

BONDING ELIMINATES HEAT WARPING IN ROTOR BLADES

Assembly of detailed one-quarter scale models of Pratt & Whitney's J-57 TurboWasp jet aircraft engine has been greatly aided by the use of a high-strength, quick-setting adhesive. Made by Atkins & Merrill, Inc., professional industrial model makers of South Sudbury, Mass., the cut-away engine models are used for training pilots and mechanics.

Each model contains several compressor and turbine rotors which are driven in the correct direction and speed ratio by a hidden electric motor. To the rotors in each model are attached from 1600 to 2000 small individual molded metal blades.

Classical techniques such as soldering and welding were found to be unsatisfactory in joining the blades to the rotor hubs. This was due primarily to a frequent warping of the blades caused by excessive heat generated in relation to the size of the blade. Such warping prevents free movement of the assembled rotor in the model.

Eastman 910 adhesive proved to be the solution because it is

A skilled modelmaker at Atkins & Merrill bonds a zinc-alloy blade to a zinc-alloy using a quick-setting adhesive.

clean, easy to apply and sets quickly. One drop is sufficient to bond each blade in place using only contact pressure. Approximately 70,000 blades have been bonded with no failures reported.

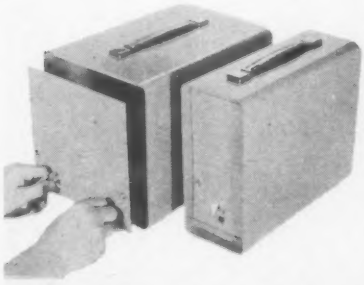
WIRE STITCHING TRIPLES HEARING AID PRODUCTION

Wire stitching machines especially suited to electronic assembly has tripled hearing aid production at Telex, Inc. in St. Paul, Minnesota.

The Bostitch No. 35 units are equipped with several types of clincher arms that clamp work that is difficult to hold while stitching. The staple is formed from 27 liquor-finish wire, driven (looped) around a vinyl sleeve coupling which holds the two wi es together. In addition, the staple acts as an anchor for attaching receiving set unit.

DESIGN INSTRUMENT CASE WITH PLUG-IN CHASSIS

A standard case for test instruments has been designed with a plug-in chassis which is locked in or removed by a half-turn cam lock. Alden Products Co., Brockton, Mass., reports that the open-sided chassis permits use of snap-in terminal cards mounted in vertical planes of circuitry.

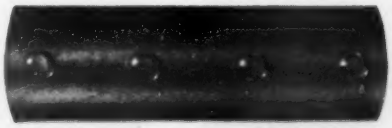


All leads are brought to an easily accessible point-of-check that can be graphically identified with circuit legends. •

ALLEN

Allenpoint's deep, full-circle bite assures tremendous resistance to removal torque! Stays tighter longer!

When you need a set screw that you can depend on to stay tight under heavy strain and vibrations, specify ALLENPOINT. Here's why you can always depend on ALLENPOINT: proper design of the cup diameter results in a rugged grip that makes the full-circle pattern you see here . . . deep, strong, clean sockets allow full wrenching leverage . . . and uniform Class 3A threads assure a tight friction lock over the entire length of Allenpoint Set Screws.



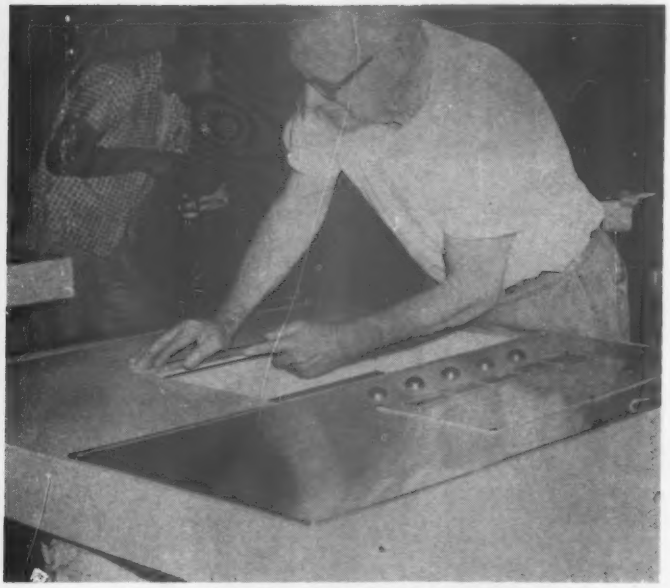
Ask your ALLEN Distributor for samples and full engineering details—he's always ready, willing, and able to give you prompt, practical service!

50 ANNIVERSARY YEAR ALLEN HEAD 1910-1960

ALLEN MANUFACTURING COMPANY

HARTFORD 1, CONNECTICUT, U.S.A.

Use postpaid card. Circle No. 233



Applying trim to door of automatic vending machine. Trim must be mounted with blind fasteners to prevent pilfering.

by **John T. Willoughby**
Chief Engineer
Automatic Vending Machine Division
U.S. Chemical Milling Corporation
Manhattan Beach, California

VENDING UNITS

Several unusual problems apply and must be recognized early in the design stage as well as in subsequent production stages of automatic vending machines. These problems accrue from the peculiar usage of these machines after they are placed in service.

Unlike most other complicated equipment, the automatic vending machine is a "lone operator" once it is on the job. There is no one around to supervise and control its operation, make adjustments, correct for errors, or protect it from miscreant violations. It becomes a "robot", so to speak, a robot charged with the responsibility of serving vicarious public purchasing needs, and doing it in a manner so that the purchasers will willingly return time and time again to place their coins in the slot!

Here at our Automatic Vending Machine Divi-

Here the inner liner has been telescoped into the cabinet and an expanding jig applied to bring it to correct dimensions. Sheet metal screws hold liner in place.

Calking the interior cabinet seam improves both sanitation and insulating properties.

Automatic vending machines must be built to withstand the rocking and pounding of people who consider it a sporting venture to get a free vend

REQUIRE BUILT-IN RELIABILITY

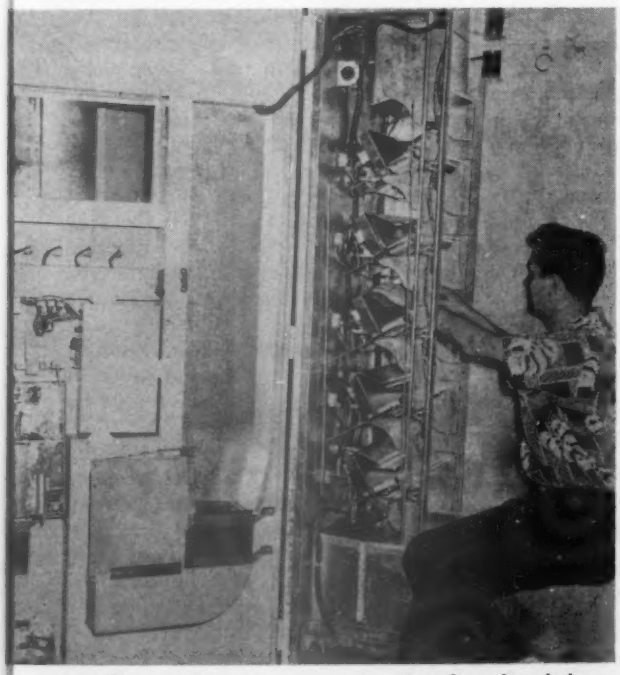
sion, we have come to regard the solution of these problems as dependent upon one of three primary vending machine functions: (1) total reliability at all times and minus human supervision; (2) proper safeguards against tampering and theft; and (3) in food machines, strict cleanliness with safeguards against unsanitary conditions. As might be expected, each of these primary functions influences assembly techniques.

To achieve its intended purpose as a profit-making sales device, the automatic vending machine must have built-in reliability. The profit margin on most vended merchandise is small, and even occasional service calls will eat drastically into this profit margin. On machines containing perishable foods, failure of the refrigeration system will cause the loss of all contents. And naturally, machine down time adversely affects both sales volume and customer goodwill. These factors, predicated against the small profit margin to start with, make almost total reliability a primary "must".

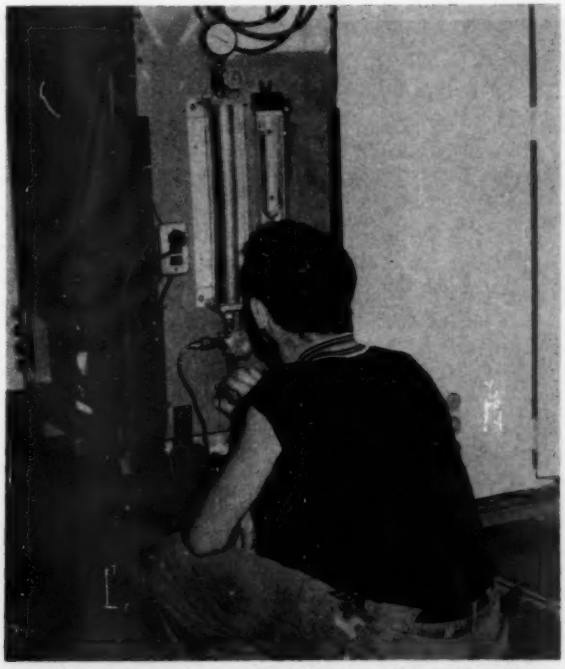
At U. S. Chem Mill, quality control coupled with exacting inspection techniques from the time raw materials and purchased parts enter the plant until the machine is ready for delivery to the customer, is used to achieve the desired high degree of reliability. This applies especially to assembly operations. Quality control men and inspectors are on the line at all times to make certain that every assembly operation is correctly performed. This is in line with the current engineering trend to make sure of product quality during assembly, rather than trying to establish that quality exists by a series of stereotyped post-assembly checks and tests.

As with reliability, the inclusion of safeguards to protect the machine from tampering and theft

continued

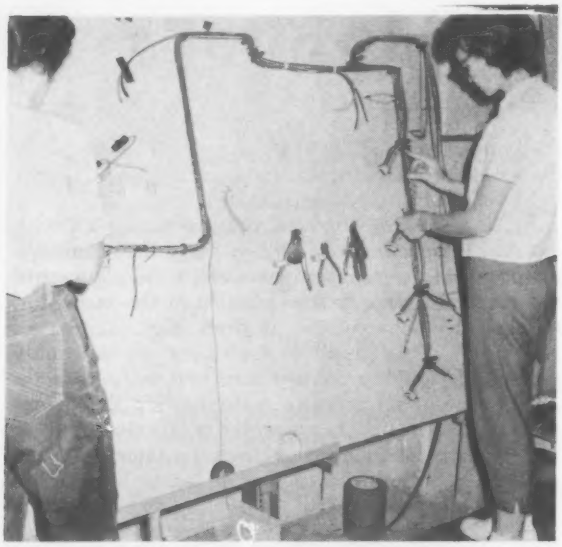


Installing vend system components. Door has already been hung on cabinet. Note complexity of pre-assembled parts.

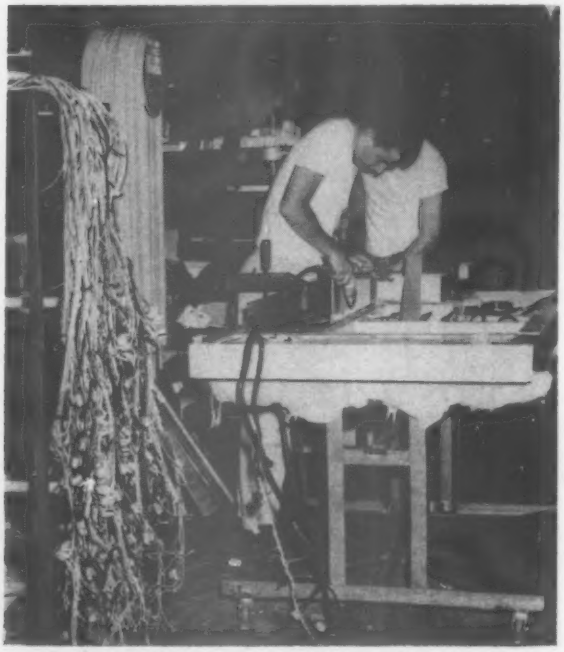


Portable refrigerant supply facilitates filling of refrigerant system as cabinet moves down line on roller conveyor.

drastically affects assembly operations. These safeguards are not necessarily directed at the out-and-out thief who wants to break into the machine for the money it contains. More specifically, they are directed at the general public attitude that being able to get a free vend from an automatic sales device is a "sporting" proposition. To accomplish this, the machine will be rocked, pounded, tilted, or even tipped on end. Probes will be inserted in the coin slots, and inward through the vend orifice.



A layout board is used in the pre-assembly of bundled wiring harnesses used in the vending control system.



A supply of harnesses are ready for installation in cabinet door being assembled in background.

If an attempt to get a free vend is thwarted, or if the machine fails to vend after accepting the coins, anything that can be removed from the exterior of the machine, such as its name plate, instruction plate, or even pieces of trim, may be carted away as a consolation trophy.

To combat this situation, a cardinal rule prevails in the design of automatic vending machines—never specify a fastener which can be removed from the outside of the machine. To do so is a direct invitation to trouble. This includes the fasteners used to mount name plates, instruction plates, and trim, as well as the many fasteners used to hold various removable coverplates in place. At the same time, these coverplates must be installed so that they can easily be removed (without special tools) for machine servicing and adjustment, and so that they will not rattle or work loose during normal machine service.

This cardinal rule leads to the use of many types of blind fasteners, including weldnuts and blind rivets, all designed for installation from one side only, and not removable from the opposite side.

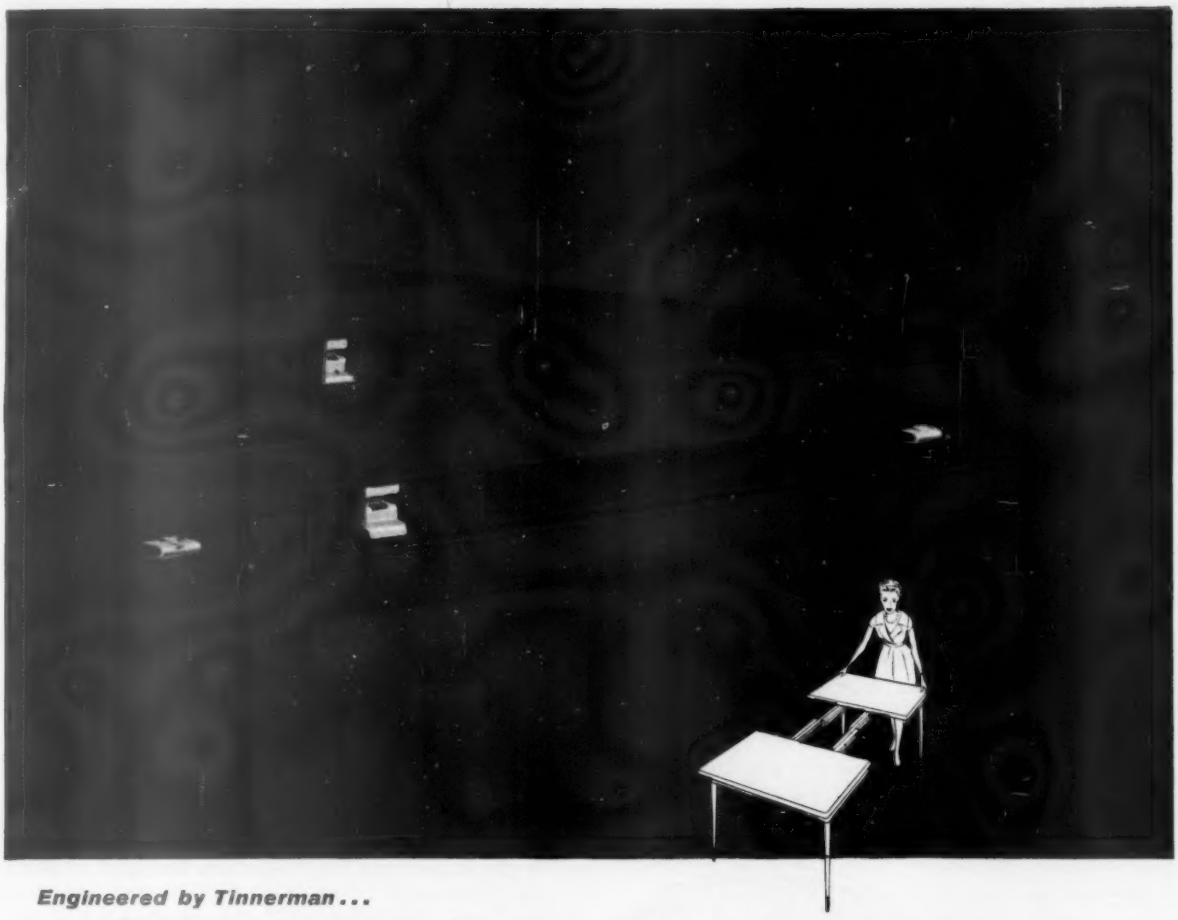
The third unusual problem, that of strict cleanliness in machines intended for food vending, and provisions to safeguard against the development of unsanitary conditions, affects practically all assembly operations. All joints must be tight and major seams must be calked to prevent the entrance and deterioration of food particles. Dissimilar metal joints which might lead to bi-metal corrosion must be avoided or properly protected. This calls for extensive use of aluminum and stainless steel materials and fasteners for all parts which will come into contact with the food contents. All such machine parts must be easily removable without tools for cleaning. In many cases, such parts are held in place with snap-on fasteners.

Most food vending machines are self-refrigerated and must include a refrigeration unit. These same machines must contain a "health control unit" which shuts down the machine in case of refrigeration failure, or when internal cabinet temperature rises to a point where food might spoil. After such a shut down, the machine must be properly serviced before it again becomes operative.

The production lines at our Automatic Vending Machine Division are laid out in a three-lane pattern, with a parts fabrication line down the center of the shop feeding two separate assembly lines which move towards the front of the shop on either side. This allows for assembly of different units on different lines, minimizing the confusion created by mixed assembly.

Three sub-assembly departments feed into the main assembly lines. One of these departments assembles the rather complicated vend system components insofar as possible before they are installed in the machine proper. A second sub-assembly department lays out and bundles the electrical wiring harnesses for interconnecting the many electrical operating components (relays, solenoids, motors, etc.) used in each machine. The lay-out of each wiring harness is accomplished on large

continued



Engineered by Tinnerman...

SPEED CLIP® replaces three parts on table-slide ...rate of assembly increased by 50%!

New all-steel nonbinding slides made by Watertown Table-Slide Company are now assembled faster, better! One Tinnerman SPEED CLIP replaces three separate parts used in earlier designs and produces double-header savings for Watertown.

This special spring steel SPEED CLIP holds the slides together firmly, yet lets them slide easily without binding. One quick stroke with an ordinary mallet seats and locks the SPEED CLIP in place. Long service life without loosening or sagging is assured.

Savings and assembly advantages like these are possible on your product too. Call in your Tinnerman representative and let him show you how. He can acquaint you with the 10,000 variations of SPEED NUT Brand Fasteners bringing similar benefits to manufacturers everywhere. He can also arrange for a FASTENING ANALYSIS of your product. This no-charge service has saved industry millions of dollars. Why not see what it can do for you? Tell us when you would like to have him call.

TINNERMAN PRODUCTS, INC.
Dept. 12 • P.O. Box 6688 • Cleveland 1, Ohio

TINNERMAN
Speed Nuts®

FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Micano-Dundy GmbH, Heidelberg.

Use postpaid card. Circle No. 259

NOW...A Kapscrew that Locks and STAYS LOCKED

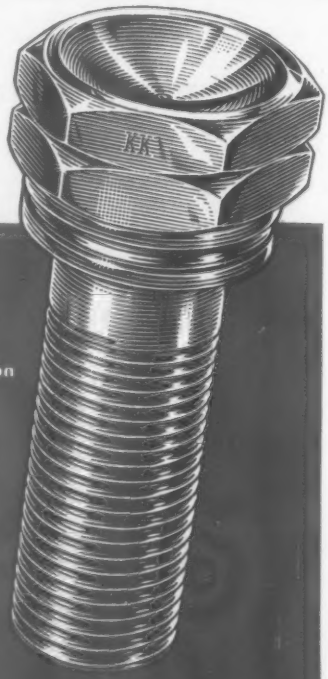
Klincher SELF-LOCKING Kapscrews

... available in various metals or materials to meet the most rigid specifications.

Klincher Self-Locking Kapscrews lock after the proper torque has been applied. The washer compresses causing the inside section of the washer to press against the shank of the bolt and kap shoulder locking-in radially and axially.

Klincher Self-Locking Kapscrews are particularly unequalled where vibration, tensile strength, corrosion and high temperature are factors. They will withstand temperatures up to 1600° Fahrenheit without seizure.

They are available in various metals or materials to meet the most exacting specifications and environment.



Write for more complete information on KLINCHER SELF-LOCKING KAPSCREWS

KLINCHER KAPSCREWS, INC.
2153 Hillside Avenue • Indianapolis 18, Indiana

Use postpaid card. Circle No. 224

peg boards containing diagrams of the path each wire must follow. These visual layout boards greatly simplify this work.

A third sub-assembly department completely assembles the vending machine cabinet doors prior to mounting them on the cabinet. Accurately-sized holding jigs are used for assembling the doorframe proper so that a close fit is assured. These doors contain many complicated operating components, such as the coin-actuated vending unit, along with a 3-inch thick blanket of fiber-glass insulation, the door inner liner, and all exterior door trim. These doors are ready for hanging on the cabinet when they leave this sub-assembly department, and need only to be connected to cabinet operating equipment by means of wiring harness leads culminating in multiple quick-connect type electrical contacts or plugs.

Main assembly operations start with installation of 2-inch thick insulating blankets in the welded steel outer cabinet. The spot-welded inner liner is then telescoped into the outer cabinet over the insulating blankets. A jig is used to expand the inner liner to outer cabinet dimensions. Holes are then drilled and blind rivets are used to hold the inner liner in place. During installation, these blind rivets pull the inner liner edge tightly against the outer cabinet.

Next, the holding brackets to which the vend system components will be attached are mounted on the inner liner walls. Rivnuts are used to attach these brackets in this blind fastening operation. The brackets are mounted after the inner liner has been telescoped into the outer liner so that the protruding fasteners will not tear the insulating blankets as the inner liner is telescoped into place.

Next, the fractional horsepower refrigeration units are installed. Then the cabinet begins to move along the final assembly line. Major inner cabinet seams are calked for sanitary reasons, and to improve insulating properties. The vending system components are installed and carefully adjusted, along with the wiring harnesses used for both power and control. At one point along the line, the system is filled with refrigerant from a portable supply which can be moved along the line to each machine as required.

Near the end of the line, the pre-assembled doors are hung on the cabinets and the necessary interconnections are made. Because of jigged preassembly, obtaining close door fit is not a major problem at this point. With the door installed, the vending machine is ready for final inspection and testing.

As already pointed out, constant line inspection and vigilant quality controls largely supersede final inspection. Final tests are limited to a check on the operation of the refrigeration system, and checks on the over-all operation of the vending systems. When these checks have been made, the machine is ready for the customer. •

"KEYSTONE WIRE made this part possible" at International Screw Company

flowability IS THE SECRET

International Screw Company, Detroit, Michigan, manufactures a special weld stud fastener for one of the 1961 automobile models. The combination large head, deep collar and weld points required unusual flowability.

This weld stud now is formed in an extreme double blow with no head or collar cracking. Keystone Cold Heading Wire fills the dies completely giving sharp, clean edges . . . long die life and trouble-free production runs. Of this, W. C. Nelson, President of International Screw says, "Keystone Wire made heading this part possible."

Here is another case where Keystone Cold Heading Wire and its flowability characteristics solved a difficult forming problem. May we suggest you, too, try Keystone Wire for difficult cold heading jobs, and for ordinary ones, too!

A Keystone Wire Specialist will gladly discuss your wire forming problems with you and make recommendations. Call him at an early date and let him show you how Keystone Flowability can help you, too.

Keystone Steel and Wire Company, Peoria, Illinois

KEYSTONE

WIRE FOR INDUSTRY

MANUFACTURED AT PEORIA, ILLINOIS, U. S. A.

Use postpaid card. Circle No. 308

Uniform gauging means UNIFORM QUALITY

for all Phillips Screws and Drivers

All manufacturers of Phillips screws and drivers are making certain that these products stay within required tolerances. Through the use of consistent ring, plug and penetration gauges, rigid, uniform high quality standards are strictly adhered to in every phase of production.

This is just part of a well integrated program, set up by the Phillips Recess Engineering Standards Committee, to establish quality control methods for the production of Phillips screws and drivers.

The members of this committee are striving to make possible faster, better, more economical techniques in high volume production everywhere. Thus industry is assured of uniform quality in *every* Phillips product . . . full benefits from "The fastener with a plus."

SCREW RESEARCH ASSOCIATION

161 PRESCOTT STREET, BOSTON, MASS.

Use postpaid card. Circle No. 235

HOW LUBRICATION AFFECTS TORQUE

Readers Forum

The publication of Convair's experience with lubricated vs. non-lubricated fasteners (September, 1960) was received with great interest by readers, based on your many letters. It is felt that correspondence between several readers and the author, Mr. E. B. Palmer, will be of interest because it brings out supplemental information which could not be included in the original article because of space limitations.—The Editors

POWER TORQUE WRENCHES

Our attention was particularly aroused by Chart No. 1, wherein it is pointed out that one can expect a rather wide scattered band when using non-lubricated bolts and nuts vs. a very narrow band when the parts are lubricated. . . .

We are wondering if in your research you have developed a torque chart for various nuts and bolts, as to what spread could be maintained under production conditions using power wrenches.

W. S. Patyrak, Chief Prod. Engr.
Transmission & Axle Division
Rockwell-Standard Corporation
Newark, Ohio.

• We have run several tests using power wrenches. Although these tests and the information gathered from them are far from complete, our findings may be of interest to you.

When we first published our specification on lubricated torque, it was intended to be used only on a few special bolted joints. Due to this very limited use, we forbade the use of power torque wrenches. When more and more of Convair's design groups started using the specification, it became necessary to revise it and allow the use of power wrenches.

We ran some tests and found that the tendency to over-torque (although the bolt preloads were very uniform) could become a real problem. These tests were assembly line manufacturing level tests. We would simply take a production bolted assembly and check bolt torque with a calibrated torque wrench. Over-stressing was detected in some assemblies.

Then we furnished one of our departments, which was doing the greatest amount of this type torquing, with air power wrenches. After determining the valve setting to obtain the desired torque-tension relationship, we re-checked all assemblies with a torque wrench. (Incidentally, these assemblies and bolts are re-used many times, and we must have absolute torque-tension values with a scatter not exceeding ±5%.) We continued to require checking by our Inspection Department with a hand torque wrench, and discovered that possibly 80% of the bolts were perfect, while the remaining 20% would have possibly 80% (+15 —0) of the required torque.

The reason for this vexing situation was finally determined. It turned out that if the mechanic happened to shut off his power wrench at about 80% of the requirements, the wrench would not start up again. We have not yet determined if this is just a characteristic of our tools. At any rate, we are allowing the use of torque control power tools in this application, but are still making a final check with a calibrated hand torque wrench.

It is strongly indicated that this requirement will soon be lifted. Our Research and Development Department have almost concluded testing of two new types of power tools that are consistently providing a controlled pre-stress in bolts that is within ± 5%. The torque engagement and release is within ± 2%.—E. B. Palmer

GASKETED JOINTS

On page 37 is the statement, "A properly installed fastener is one that has an induced tensile stress in the bolt that is greater than the outside load that it supports in service".

Have you not made the assumption that all the deformation due to bolt load occurs in the bolt? If this condition is not true, your statement concerning bolt load in fatigue is not true. This assumption cannot be made for a gasketed joint.

Fred H. Posser, Consultant
Electronic Systems & Techniques
Airborne Instruments Laboratory
Deer Park, Long Island, N.Y.

• In our tests we did not assume that all deformation occurs in the bolt. The deformation occurs in the bolted structure, the gasket, the bolt, washer

continued

Notice how specially designed strike, base and link have been adapted to gear mechanism. Ask for GEAR-LOCK clamp GL-101.

For mounting on flat surfaces. Ask for Hook type clamp HR-1.

CHOOSE FROM THE LINE THAT GIVES YOU MORE TO START WITH!

With more to choose from, you'll probably find just what you *need* to start with. The Bassick line of clamps and fasteners includes hook, loop, hinge, springloaded and gear-lock types as well as many special duty clamps.

The *real* beauty of the Bassick line is its unusual flexibility. We frequently adapt one of our many standard clamps or the component parts to *solve* specific customer problems—save money and time. Send for catalog: Bassick Clamps and Fasteners. It may well help obtain better fastening for *your* containers.

THE BASSICK COMPANY, Bridgeport 5, Conn. *In Canada:* Belleville, Ont. O.14

Symbol of SW Excellence
Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

Use postpaid card. Circle No. 226

and nut. This does apply to gasketed joints as the gasket material has deformed its ultimate long before 65% of ultimate stress is reached on the bolt. Otherwise, the gasket material is harder than the structure to be joined.—E. B. Palmer.

FATIGUE FAILURE

In reading the article I found a statement in the third paragraph which I believe needs some clarifying. It is the statement that a bolt which is torqued to a load greater than any applied load cannot fail in fatigue.

I believe that this statement should be amended to read " . . . . is least likely to fail in fatigue", because of the fluctuating stress produced in a bolt by a fluctuating load smaller than the load in the bolt.

Donald J. Larson
Joliet, Illinois

This article is a valuable contribution, but contains a statement which I feel may be misleading if left unmodified. In the third paragraph it is stated that a bolt preloaded in excess of working load cannot fail in fatigue, because there is no change in tensile stress.

I am sure the author will agree that this is actually never theoretically true, although practically it is true for relatively flexible tension members and relatively very rigid compression members. This is a practical consideration, not an academic difference of opinion.

Douglas M. Jones
Consulting Engineer
USI Axelson Division
U.S. Industries, Inc.
Los Angeles, Calif.

First Man into Outer Space

ELCO®

COLD-HEADED SPECIAL PARTS

FOR THE MODERN MISSILE AGE...

With so many things going at jet-power and rocket-speed, it is no wonder that designers and manufacturers are constantly looking for short-cuts, for cost-reducers, for longer life, for efficiency, for product improvement, for profit betterment. The adaptation and adoption of ELCO Cold-Headed Special parts can often gain many of these searched-for advantages. The cold-headed parts shown here are all recent outputs of ELCO engineering brains, planning know-how, and production experience. *If a particular part here interests you, mark it; then tear out this advertisement and send it to us.* We will tell you the whole story on that part, so you can decide if you want something like it. Send us prints or samples of parts you are now using—we would be pleased to quote. *Ask about the services of our process engineering department.*

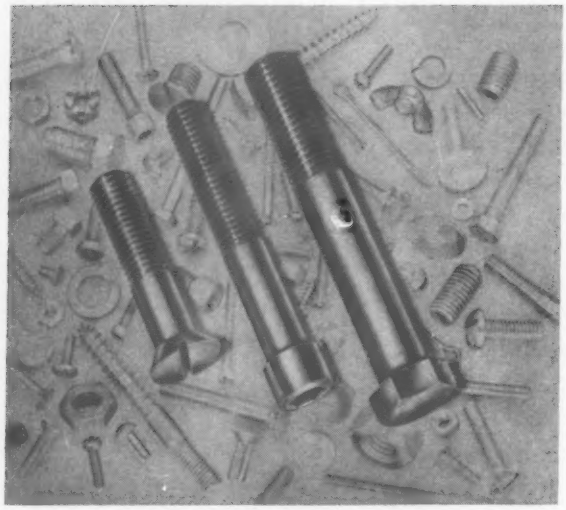
ELCO TOOL AND SCREW CORPORATION

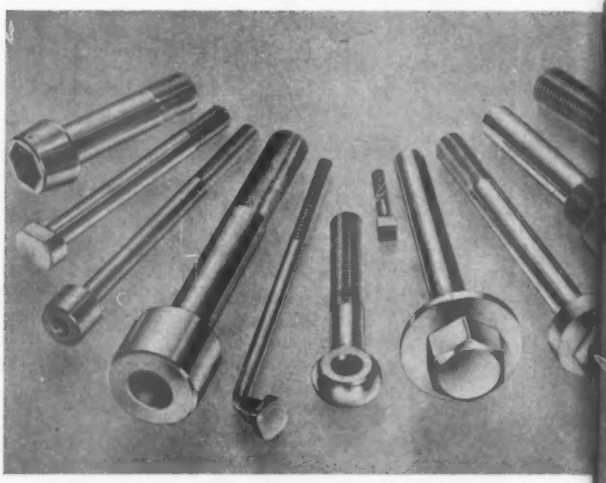
1101 SAMUELSON ROAD, ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 227

Presenting engineering, aesthetic and economic reasons for specifying fasteners made from non-ferrous and stainless steel alloys

A LOOK AT CORROSION-RESISTANT





Typical corrosion-resistant fasteners and hardware items.

With the cost of corrosion to American industry in the neighborhood of 10 billion dollars a year, there exists the necessity for the wise selection and application of corrosion-resistant materials, and especially bolts, nuts, screws, washers, and special fasteners.

To give an idea of how widespread is the corrosion problem as it pertains to fasteners, here are some specific problems which industry has sent to our fastening-metallurgical engineers in the past few months:

1. A study of etching acids to determine the best test for intergranular corrosion of stainless steel.
2. A study of fastener materials that should be used in uranium slurry.
3. A study of propeller locking pins for use in salt water.
4. A study of gasket material to better insulate against corrosion.
5. A comparative study of corrosion-resistant fasteners vs. steel fasteners in fluorine cells.
6. A study of the corrosion resistance of fasteners in degassed and oxygenated water for A.E.C. applications.
7. A study of titanium fasteners in chlorine and 50% sulfuric acid conditions.

The above are only a few of today's active projects that suggest the wide scope of the corrosion problems involving fasteners.

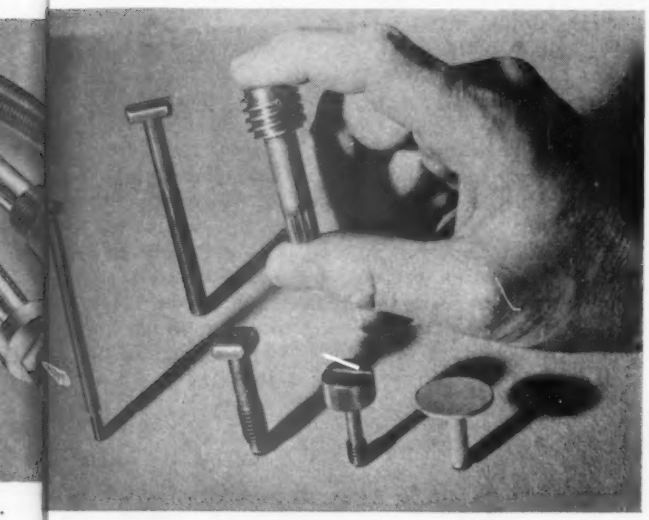
Corrosion resistance is the basic appeal of non-ferrous and stainless steel fasteners, but the corrosion resistance characteristic is not the single value of these metals. Low weight combined with high strength, electrical conductivity, non-magnetism and extreme-temperature resistance are all characteristics prevalent in selected alloys from the non-ferrous and stainless steel alloy group.

Examples of high strength/weight ratios are illustrated in the non-ferrous group by titanium and aluminum alloys. Electrical conductivity is found in copper and aluminum (and some of their derivatives). The non-magnetic quality of most non-ferrous and stainless steel alloys is as much a common denominator to their characteristics as is corrosion resistance. Wide variations in temperature are resisted by the stainless steel alloys as well as certain non-ferrous alloys.

Aesthetic considerations are more difficult to quantify. However, aesthetics in durable consumer products are an additional justification for using corrosion-resistant fasteners. For example, convertible owners, who pay three or four thousand

by **Robert D. Tuttle**
Asst. to Sales Vice President
The H. M. Harper Company

FASTENERS



dollars for their motoring pride, have a right to be indignant about thinly-plated carbon steel fasteners used to fasten hardware inside the convertible top. Lawnmowers, tv antennas, storm windows, pleasure boats and farm equipment are only a few examples of other products which obviously would benefit aesthetically from corrosion-resistant fasteners. Unfortunately many such products are not so equipped.

Actually, the engineering reasons for specifying corrosion-resistant fasteners boils down to common sense and high-quality objectives. There is no doubt about it; fasteners made from corrosion-resistant metals can improve the appearance as well as increase the life of consumer goods. Let us remember that appearance and service life are the hearts of quality.

What about defense products? Again, let us view an example. In the atomic submarine, conditions are such that all the characteristics of non-ferrous and stainless steel fasteners are called upon. The need to combat the corroding effects of salt water, the need for minimum weight loads, the need for electrical conductivity, the need for anti-mine non-magnetic qualities, the problems of heat in nuclear reactors and the problems of environmental cold are all easily seen. From bow to stern or from

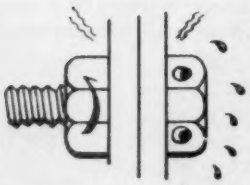
continued

Types of Corrosion

Uniform Corrosion: The common type of corrosion that attacks iron or steel products exposed to the elements. Weathering processes act to combine the surface of the metal with oxygen, resulting in a reddish-brown coating called rust.

Galvanic Corrosion: This is caused by the coupling of unlike metals in an electrolyte which causes an electrical transfer of particles from one metal to another.

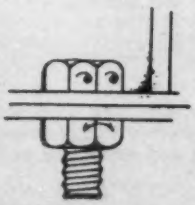
Pitting: Even passive (corrosion-resistant) metals will corrode in specialized environments. Extreme temperature, acids or other factors will cause a localized breakdown of the material. The weakened area then becomes the anode and loses metal to the passive or cathodic area.



Stress Corrosion: Stresses in metal caused either by internal or external pressures, such as a bolt and nut assembly, will create paths within the grain of the metal which tend to corrode more readily under certain conditions. Corrosion is accelerated along these boundaries, resulting in premature failure.

Corrosion Fatigue: This is similar to stress corrosion except that the stresses are cyclic. Repeated loading and unloading usually causes accelerated rates of corrosion over those found in static stress corrosion.

Stray Currents: Fabricated metal sections, either buried or in a solution, sometimes come in contact with electric currents caused by extraneous influences such as generators or motors. This frequently causes an accelerated disintegration of the metal.



Concentration Cell Corrosion: This is sometimes called "deposit attack" or "crevice corrosion". It refers to the tendency of corrosion to build up more rapidly in the cracks and crevices of an assembly.

nuclear power plant to galley equipment, the application of non-ferrous and stainless steel fasteners insure long life, perfect function and safety in our defense weapons beneath the sea. They are equally commonplace in defense products on the ground and in the air.

ECONOMIC CONSIDERATIONS

What about the economics of corrosion-resistant fasteners? They are low-cost commodities when measured in terms of their remarkable metallurgical characteristics and their small portion of over-all costs. The selling price is related to the economics involved in the selection of the specific material and in the production of the specific item. A fastener manufacturer specializing in this field does not normally produce runs in the millions of pieces as do other fastener firms. An order for 5,000 pieces of a ½-13 x 4 machine bolt is a very respectable order in the corrosion-resistant field. Yet this 5,000 piece order entails all the paperwork and manufacturing detail that would be accorded a 1,000,000 piece order in other segments of the fastener industry.

HINTS FOR MINIMIZING CORROSION

1. Select the metal most likely to resist the corrosive environment to which it will be subjected in service.

2. Use combinations of metals close together in the galvanic series.

3. Avoid making combinations where the area of the less noble material is relatively small.

4. Avoid irregular stresses in design. Even high stresses in bolted assemblies do not necessarily impair corrosion resistance as long as they are uniform.

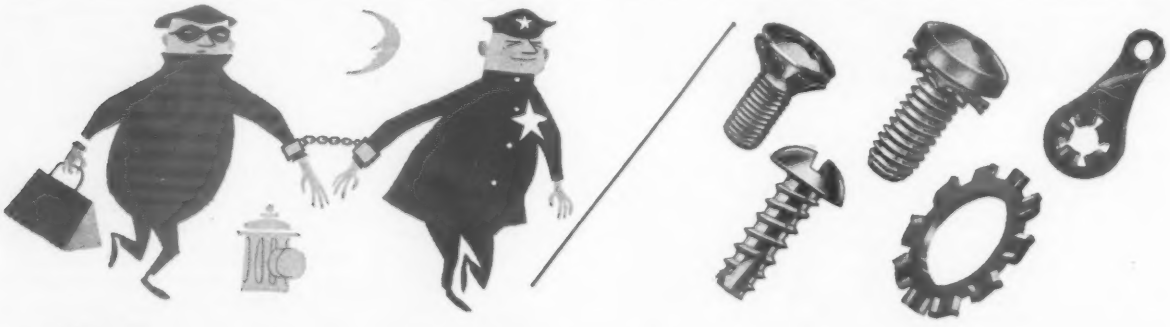
5. Insulate, paint, or coat dissimilar metals wherever practical.

6. If practical, add suitable chemical inhibitors to a corrosive solution.

7. If you must use dissimilar materials, keep them far apart and avoid joining them by threaded connections unless insulated.

8. Couple to the item you wish to protect some pieces of less noble metal which are not functional in the assembly and can thus corrode sacrificially.

In summary to this brief discussion, it can be truly said that the initial cost of corrosion-resistant fasteners is very much in line with the costs of plain ferrous fasteners when the long-term benefits in reliability, high product efficiency, low upkeep, and continued customer good will are correctly measured. In this respect, the manufacturers of durable consumer goods can take a cue from large segments of the manufacturing industry which already are cognizant of the long-term savings associated with corrosion-resistant materials. •



Togetherness

matters with industrial fasteners, too!

Togetherness, industrial style, has a special meaning at Thompson-Bremer because we are one of the few fully integrated manufacturers of Sems, lock washers, thread-cutting screws, terminals and cold-headed specialties. With our engineering services and components manufacturing together under one roof, we can give you faster, more individualized service at competitive prices. We'll bid on your specials requirements, or fill orders for standard items on short notice from the extensive line of EVERLOCK products stocked by your local distributor.

If you buy or specify industrial fasteners, you want whatever your company assembles to go together economically and stay together reliably. Send for catalog and samples or call your EVERLOCK representative.

AMF Everlock INDUSTRIAL FASTENERS

Thompson-Bremer & Co. Division of American Machine & Foundry Company

Thompson-Bremer & Co., Dept. 29
228 N. LaSalle St., Chicago 1, Ill.
Please send me:
_____EVERLOCK fastener catalogs_____samples of EVERLOCK industrial fasteners and cold-headed specialties.
Name_____Title_____
Company_____
Street_____
City_____Zone___State_____

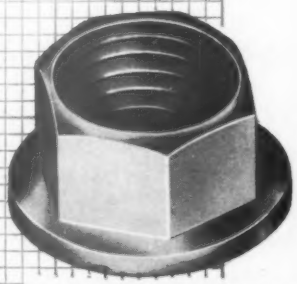
Use postpaid card. Circle No. 261

Again...

ESNA gives the design decision to the engineer

If your major consideration is...

...WEIGHT REDUCTION

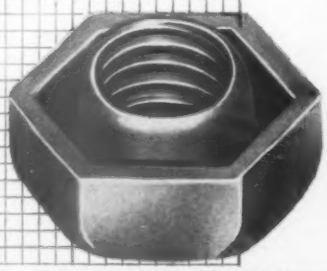


Type LH3324 (160,000 psi)
MS 21042

THIS NEW DESIGN is ESNA's recommendation for applications where space and weight reduction are primary needs. Meets MIL-N-25027; reduced wrenching dimensions permit more efficient centerline bolt design; wrench heights carefully engineered to assure satisfactory assembly line performance. Materials: carbon steel, AMS6304 alloy steel and A286 stainless steel.

wt in lbs per 1000	Screw Size # 4	# 6	# 8	# 10	¼"	5/16"	3/8"	tensile rating
LH3324	.2	.6	1.3	1.4	2.9	5.4	7.3	160,000 psi
NAS679	.9	1.7	2.4	2.6	4.6	6.4	8.6	140,000 psi
AN365	1.4	2.6	4.2	5.0	9.0	12.0	18.0	140,000 psi

...USE OF NAS STANDARD HARDWARE



Type LHTE-TM (NAS 679 140,000 psi)

This complete line of low-height, lightweight NAS 679 hex nuts has been designed and produced to ESNA's exacting quality standards. Qualified to MIL-N-25027. External-internal wrenching surfaces for easy installation in limited access areas. Sizes 4-40 through 7/16-20. Alloy steel for temperatures to 550°F; A286 stainless steel for temperatures to 900°F and nonmagnetic applications.

ESNA offers a complete line of ALL NAS types of self-locking nuts, including standard and miniature anchors, floaters and gang channels.

...ULTRA-HIGH TENSILE AND FATIGUE PERFORMANCE

Type LH3393 (220,000 psi)

Specify types LH 3393 and LHEB 220 for the utmost in high tensile and fatigue-life performance. Highest strength-to-weight of any available double hex design. Cold-formed from alloy steels; sizes ¼-28 thru 1". For use at temperatures to 550°F.

Other lightweight 12 point nut series are available in several tensile capacities and materials for service at temperatures to 1300°F.

Fit the fastener to the application from the only complete line of self-locking fasteners

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. S36A-1297, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

☐ **Complete dimensional and performance data of the new type 3324 nut.**

☐ **Visual Index: A complete pictorial representation of all standard Elastic Stop nuts.**

Name_____ **Title**_____

Firm_____

Street_____

City_____ **Zone**____ **State**_____

Use postpaid card. Circle No. 228

PERFORATED ALUMINUM BOARDS

Plywood boards with nails are obsoleted with a switch to perforated aluminum boards using special steel pins with collars. With new boards, Raytheon finds a net saving of $2000 a year on some cable operations.

Above: With the light source behind the board, configuration of cable harness shows through, enabling the jig maker to place pins in proper holes. Pins have steel collars to prevent them from penetrating all the way into metal board.

Right: Laying in wire on the board. Jig making with these perforated aluminum boards is much easier than with plywood boards. Assembly and disassembly of aluminum boards can be done in about half the time.

ECONOMIZE HARNESS ASSEMBLY

Something new has been added to the tools of the trade for the jig maker—perforated aluminum harness boards. At the Raytheon Company, Waltham, Mass., these metal boards are replacing plywood harness boards.

The trouble with plywood boards according to Raytheon cable assembly engineers, is their inability to "take it". Used a few times, the nail holes keep enlarging, rendering further use of the boards prohibitive.

In addition, the wooden boards present a storage problem. They cannot be stored one on top of another without nails in the bottom boards becoming bent. Removing the nails would be no solution as this would only aggravate the perforation size problem. This made necessary a special storage room with pipe racks, metal holders, etc.

By using special steel pins with collars (the latter to prevent pins from penetrating too deep), the aluminum boards are readily adaptable to stacking. The pins are easily removed to permit flat storing of the boards. Conservation of space is thus achieved and handling time greatly reduced.

In using the aluminum boards, jig makers place the cable harness blueprints over the perforated boards. Then a light source is placed behind the raised boards. This serves to bring out sharply the cable configurations on the blueprints, enabling the jig maker to insert the steel pins all along the cables at ⅛" intervals.

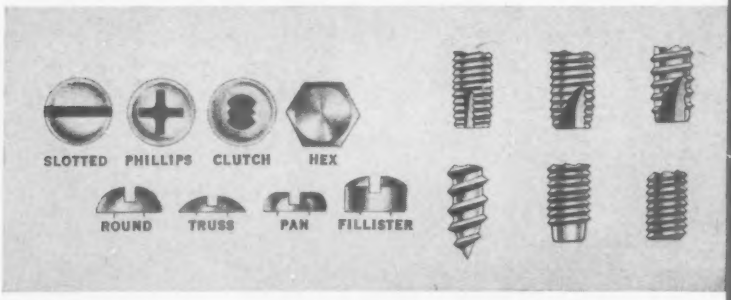
Lay-in of the cable wire then is routine, as in present practice.

With the development, Raytheon is obtaining a net savings of over $2000 a year on some cable board operations. Added advantages come during assembly and disassembly of the cable board jigs. Handling time is halved and storage space greatly increased •

With the old method, plywood boards take up much storage space and must be carefully hung on racks. Metal boards (after removal of steel pins) can be quickly and easily stacked. Moreover, they last for years.

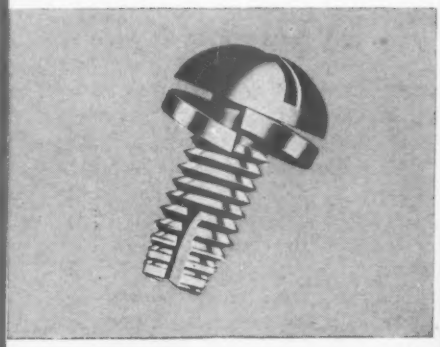
SAVE 3 WAYS

on production costs



EATON-RELIANCE

SPRINGTITES®



1. Speed up assembly by reducing the number of motions on the production line with Eaton-Reliance Springtites —which are bolts or screws preassembled with spring washers. Scientific light-line studies prove many motions are eliminated by using these fasteners.
2. Keep inventory balanced and make stock handling easier by always having the number of spring washers equal that of the screws or bolts. This also saves on paper work by reducing the number of stock requisitions and orders.
3. Minimize "sweep-out" waste by using one preassembled fastener instead of two fastener components. Being easier to pick up, springtites are less apt to be dropped, lost and wasted. In hopper-fed operations, preassembled fasteners are more efficiently and easily handled.

Eaton-Reliance Springtites are made from top quality steel, cold drawn to rigid specifications in the Reliance mill.

Write for our new 16 page full line catalog containing complete information.

EATON

RELIANCE DIVISION
MANUFACTURING COMPANY
550 CHARLES AVENUE • MASSILLON, OHIO

SALES OFFICES: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Los Angeles

Use postpaid card. Circle No. 229

A switch from automatic machines to simple tools for assembling laminations yields a better over-all net economy

SIMPLE TOOLS FACILITATE MOTOR ASSEMBLY

With the simple tool in foreground, stacks of motor laminations of uniform height are picked up and laid on a bench from where they are set on the assembly conveyor in background. There rivets are inserted.

by **G. B. Howell**
Vice President, Manufacturing
The Leece-Neville Company
Cleveland, Ohio

In the highly-competitive small motor market, assembly operations must be performed rapidly and at a relatively low cost. And with the aid of some simple tools, such work is being performed on a high volume basis in one of our plants which turns out motors for such automotive applications as heaters and windshield wipers.

In this plant, stamped laminations are stored in stacks whose height has to be reasonably uniform, despite slight variations in the laminations. They are delivered to the assembly line in long stacks with temporary wires (inserted through rivet holes) holding the laminations in line. These wires are removed after the laminations have been laid in the channel holder as shown in photo at left.

Until recently, short stacks were prepared in automatic machines, but because of excessive downtime a new method was developed. Now this work is done with a simple hand tool. A rod extending from the tool handle passes through a tight-fitting hole in a thick fibre block. This rod is longer than the height of any stack needed. In use, the rod is laid in the groove formed by the notches in the top of the long stack in the channel.

Two other parallel rods run through the fibre block. They are so adjusted that their length—

continued

GRIPCO TOPLOCK NUT
One piece all-metal
GRIPCO CLINCH NUT
With or without self-locking threads. Hex collar prevents turning when torqueing bolt.

You get these "extras" when you specify

GRIPCO®

GRIPCO PILOT PROJECTION WELD NUT
With or without self-locking threads. Centering collar positions nut and protects threads from weld spatter.

FASTENERS—

Service—40 sales representatives all over the country for prompt, fast service.

Reliability—Quality controlled by the oldest established lock nut manufacturer in the U.S.

Stock—Large inventories to ensure out of stock delivery on all catalogued items.

Speed production and lower costs on your products with this GRIP NUT family of GRIPCO FASTENERS. Qualified fastener engineers are available for consultation on all your assembly problems. Consult the yellow pages in your phone book under "GRIPCO" for the one nearest you.

Other Gripco Products:

- Brass Toplock or Centerlock nuts.
- Miniature weld and clinch nuts, with or without lock.
- Toplock and Centerlock Hi Nuts.
- Standard Semi-finish full and jam nuts.
- Stainless Steel lock, weld and semi-finish nuts.
- Cold formed special nuts or parts to print.

Send for samples and NEW CATALOG today

GRIP-NUT COMPANY 125

113 MAPLE AVE.
SOUTH WHITLEY, INDIANA
Phone: South Whitley 723-5111

Subsidiary of Heli-Coil Corporation, Danbury, Conn.

Use postpaid card. Circle No. 230

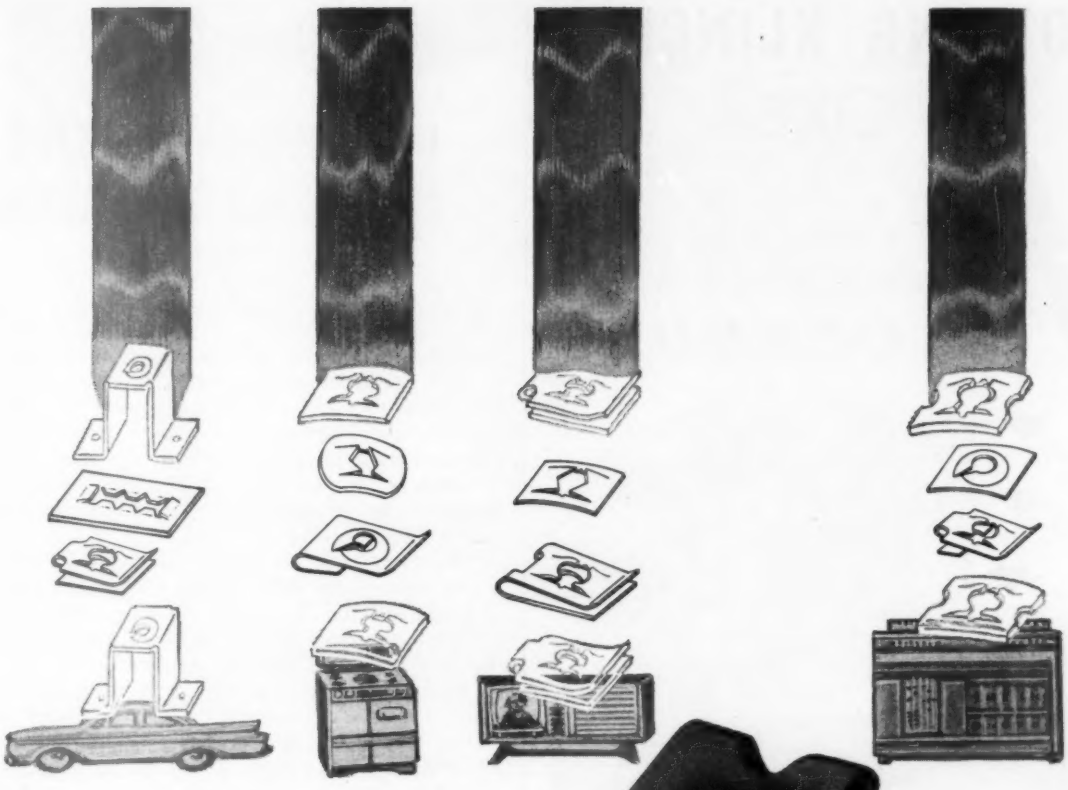
from block face outward—equals the height of two stacks to be separated from the long stack. But only one rod is used for any given stack. When the rod is placed by hand in the outer groove, the shorter bar (to be used for the stack height needed) enters the long stack, with the face of the block resting against the stack face. Then the operator lifts the tool and tilts it as shown. This results in picking up a stack of the height needed. The operator merely uses her other hand to place the stack on the conveyor. If a stack of a different height is needed, the third rod is used.

Assembly workers along the conveyor then insert rivets in the holes as the stacks advance toward the press that sets the rivets.

This press has a 6-station automatic indexing dial. Each station has fixture pins that locate the stack set over them by hand. When each stack is indexed under the ram, it descends, pressing the laminations tightly together and setting the rivets.

With this setup, it is possible to prepare and rivet about 1000 stacks an hour, using inexpensive equipment without the delays that made the automatic stacker unsatisfactory. Production equals that formerly attained but yields a better net economy. •

Each stack reaching this station is placed in a fixture on indexing dial of Multipress. When the stack moves under the press ram, laminations are pressed tightly together. The rivets inserted previously are set permanently.



productivity

Garrett OF PHILADELPHIA

SPRING FASTENERS

increase production — reduce costs

Whether your product is large or small, plain or fancy, simple or complex, mass-produced or custom-built . . . there's a strong probability that a GARRETT Spring Fastener will increase your productivity—make it easier to build . . . easier to assemble . . . less costly . . . and better!

Usually . . . one of the many varieties and sizes of cone or twin-prong flat nuts, "J" nuts or "U" nuts and push-ons, in GARRETT'S large stock, will do the job nicely. But . . . when a special fastener is required, GARRETT again serves . . . by imaginatively designing and promptly supplying effective fasteners in sample quantities. And . . . Garrett products are of the highest quality. Every step in the manufacture of GARRETT Spring Fasteners is subject to the most rigid control because GARRETT itself performs **every** operation. There is no subcontracting . . . no divided responsibility.

When you specify GARRETT Spring Fasteners . . . you specify extra service . . . higher quality . . . greater dependability!

For further information, write GARRETT . . . THE MOST COMPLETELY INTEGRATED PLANT IN THE INDUSTRY.

Garrett SPRING FASTENERS

GEORGE K. GARRETT COMPANY, INC.

8833 TORRESDALE AVE., PHILADELPHIA 36, PA.

OTHER QUALITY PRODUCTS BY GARRETT

helical spring lock washers | flat washers | stampings | hose clamps | spring washers

Use postpaid card. Circle No. 231

NOTHING KLINCHES LIKE *Klincher* LOCKNUTS

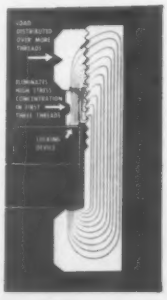
Isochromatic of photoelastic Klincher Locknut model and conventional nut under same load condition showing stresses set up in stud.

Scientific evaluation now proves what smart engineers have always known—nothing Klinches like *Klincher Locknuts*.

Recent photoelastic stress analysis conducted at the University of Minnesota proves that stresses in a *Klincher Locknut* were less than half as great as in a conventional nut under the same load conditions. The stress effect on the stud is one and one-half times greater with a conventional nut.

Thermal expansion up to 1600 degrees Fahrenheit and contraction is compensated for by *Klincher* spring action.

The *Klincher Locknut* locks after the proper torque is applied by compressing the threaded section inside the washer against the bolt, both radially and axially. The high load stress and torsional load are distributed evenly in the main body of the nut. More wrench torque can be applied before exceeding the elasticity in the bolt.



For high temperature fastening, particularly where road shock, high frequency vibration and tensile strength are factors . . . specify *Klincher Locknuts*.

More complete information on *Klincher Locknuts* is available. Write for data and samples, giving size and application.

KLINCHER LOCKNUT CORPORATION
2153 Hillside Avenue • Indianapolis 18, Indiana

Use postpaid card. Circle No. 232

At Continental Controls . . .

INDEXING UNIT SPEEDS COMPONENT SOLDERING

A simple indexing machine has led to a substantial reduction in soldering time on valve components at Continental Controls, Lakewood, Ohio.

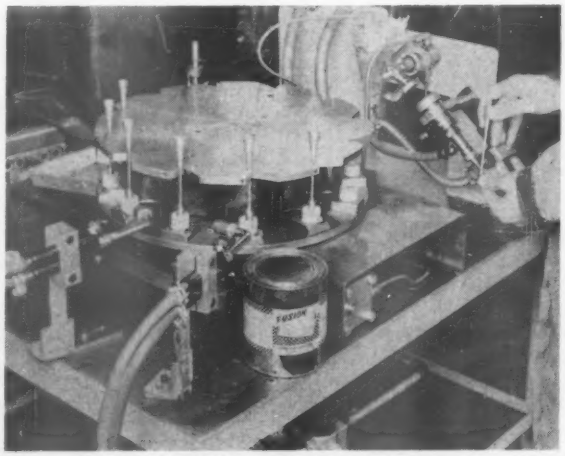
Their production rate now is one soldered assembly—two soldered joints—every 10 seconds, reports Jack Britton, president. Previously each operator completed one part every three minutes. Savings in two months paid for the initial investment in the semi-automatic machine designed by Fusion Engineering.

The component involved is an extension tube for a hot water tank relief valve. It requires soldering the tube to the thermostat housing and soldering a brass insert inside the housing. These joints are made at the same time on the machine.

As the valve component is picked up by the operator, it is positioned under the nozzle of the solder applicator and receives a metered amount of solder paste (solder and flux combined). The insert is placed in the housing and a second metered amount of paste is applied as the extension tube is inserted. It is then loaded into a special ceramic fixture and positioned in a slot spring loaded to hold the part.

As the table indexes, the stem passes in front of a pre-heat air gas torch, then a final heat torch. It then air-cools for two stations before it is automatically ejected onto a slide.

The key to the operation is rapid application of the solder and flux to the parts. This is necessarily a semi-automatic application since the brass insert is hidden and not accessible for automatic application. •



One soldered assembly (two soldered joints) every ten seconds is the production rate with this machine.

Millers Falls® drivers boost production 20% at Emenee Industries

Maintenance costs 25% less

Accurate "Adjustomatic"® Clutch

William Kreizel, partner at Emenee Industries, Inc., world's largest manufacturer of musical toys says: "Based on our successful experience with Millers Falls screwdrivers, I am sure we will eventually standardize entirely on these high production tools."

Ninety Millers Falls drivers are now operating on Emenee's fast-moving assembly section. Kreizel and Herbert Brummel, Emenee production and tooling engineer, decided on MF Drivers for these important reasons:

"Exclusive 'Adjustomatic'® clutches give operators accurate and uniform torque control far beyond the capabilities of our old drivers. Smallest screws are never driven too deeply. Cracked cabinet frames and metal joinings are eliminated.

"Versatility of the many quick-change auxiliary attachments and varied suspensions ideally suit our needs.

"Extremely long life and trouble-free operation saves us money and production loss by minimizing down-time.

"Simple operation makes it possible to train unskilled workers to do close-tolerance jobs rapidly and efficiently."

As at Emenee, more and more manufacturers are finding Millers Falls electric screwdrivers are the answer to faster, more economical assembly. No job is too small or too tough for MF drivers. Full information on request — or why not let us arrange for a demonstration on your own work?

MILLERS FALLS TOOLS

Write today for full information

MILLERS FALLS CO.
Greenfield, Mass.
Dept. AF-2

Use postpaid card. Circle No. 223

CANCER CAN BE CURED

More than one million Americans are living proof. Remember . . . your contributions helped save many of these lives. Your continuing contributions are needed to help discover new cures and, ultimately, the prevention of cancer itself • Remember, too, if you delay seeing your physician, you drastically cut your chances of cure. Annual checkups are the best way of detecting cancer in time • Guard your family! Fight cancer with a checkup and a check.

AMERICAN CANCER SOCIETY

REPRINTS AVAILABLE

- "Design and Application of Weld Fasteners" — July and August, 1959
- "Torque Considerations in Design"—January, 1960
- "Which Thread — Coarse or Fine?" — February, 1960
- "Designing for Silver Brazing with Preforms"—April, 1960
- "Resistance Welding Stainless Steel"—June, 1960
- "The Strength of Screw Threads"—June, 1960

If you need copies for your files, just drop us a note on your company letterhead.

Reader Service Department
ASSEMBLY & FASTENER ENGINEERING
Wheaton, Illinois

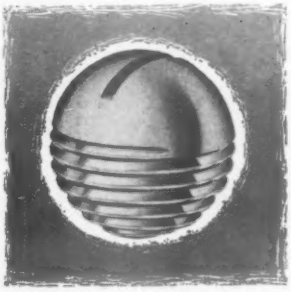
AS SMITTY SEES IT

Got a question, challenge, puzzle to share or story ot tell? Shoot it along, we'd like to meet you.

SPACE VEHICLE RELIABILITY

In a study, "Flywheel Control of Space Vehicles," Jim Vaeth of The Martin Company concludes that "the added complexity of compensating for gyroscopically induced torques does not warrant the associated degree of dynamic accuracy improvement." Furthermore, the problem of flywheel saturation can be solved by careful utilization of the dumb-bell effect for space vehicles.

And here all the time we've been blaming it on cheap fasteners.



LITTLE THINGS COST A LOT

It is somehow reassuring to know that in the rush to spend billions towards the Conquest of Outer Space, our scientists have not lost the knack of spending taxes on the insignificant and miniscule. One department, for instance, is studying 1) the physiology of the octopus 2) the parental age of mealworm beetles and 3) the aging of cockroaches. These projects we can comprehend, but does somebody know why the Food and Drug Administration want $2 million to air-condition 720 dog houses?

MONROE DOCTRINE FOR FASTENERS?

We indorse the grass-roots sentiment that the job of buying fasteners should be kept as uncomplicated as possible. Since we already have to decide on type, size and finish, why add nationality?

MATH OVER LIGHTLY

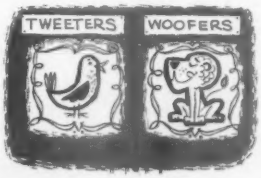
The hands of a clock are together at 12 noon. At what time in the afternoon will they be together again? (Answer on pg. 65)

NEW PRODUCTS

In all due modesty the engineers over at Dumont Industrial Screw admit that they have the largest selection of Screwballs in the industry. The proof is in the fact that not one of their competitors has ever challenged their claims.

IRONING OUT THE BUGS

A member of our staff, who understandably requests anonimity, added his postscript to the now-exterminated slogan "Where there's life, there's bugs", for an insect-killing floor wax. He claims that the plaintiff, Anheuser-Busch brewery, could have had it a lot worse. Chemical Corp. of America could have also said "Be Bug-Wiser."



WHICH IS WHICH?

Engineers at Packard-Bell Electronics Corporation (manufacturers of radio, TV and hi-fi equipment) are completely sold on their products. Witness the names on their restroom doors: "Woofers" and "Tweeters".

"For every designer who thinks it's perfect, there's a production man who says it can't be done."

HIGH CLAMP-UP MEETS MACH 2 STRUCTURE NEEDS

hi-Lok®

Faster the speed, more varied the mission . . . the more critical are the structural requirements. Such is the Navy's newest all-weather, nuclear weapons carrying aircraft . . . the carrier-based A3J Vigilante.

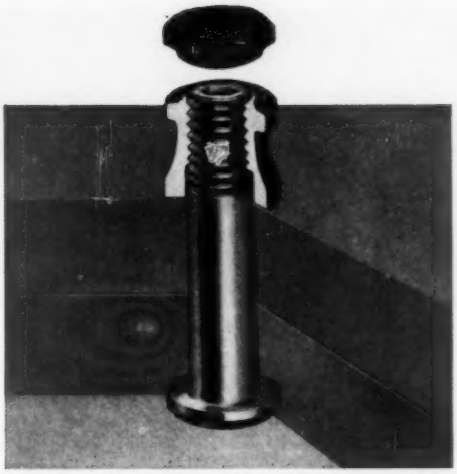
Because of their excellent residual preload characteristics, Hi-Loks were selected for use throughout the A3J primary structure. The unique Hi-Lok torque-off feature produces a high, uniform clamp-up of high tensile sheet materials in *all* grip conditions. The installation method is smooth and quiet.

Inexpensive, lightweight, Hi-Lok tooling reduces worker fatigue and avoids the need for heavy squeezers or bulky pull-type equipment and their limitations in close quarters. In open areas, Hi-Loks can be installed at speeds up to 45 per minute.

Write or contact us for Hi-Lok technical and specification data.

hi-shear CORPORATION

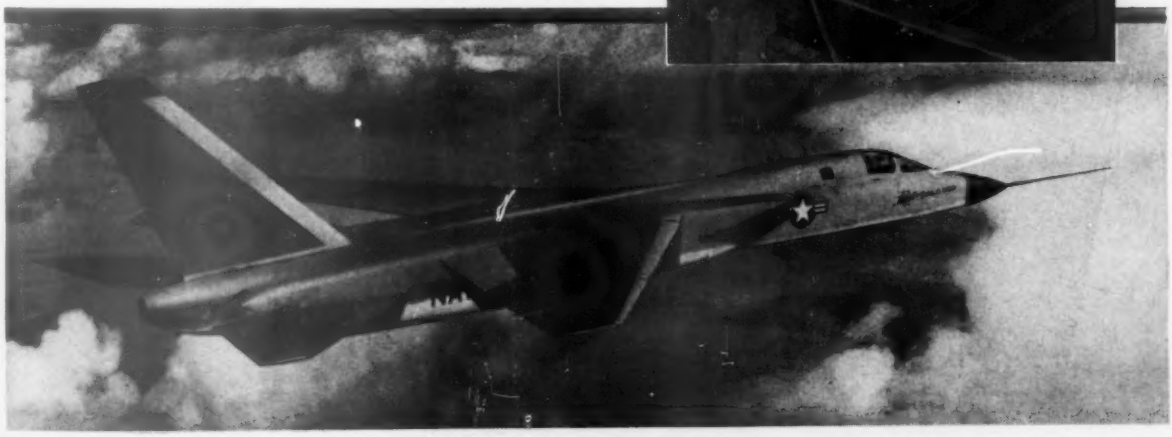
2600 WEST 247TH STREET • TORRANCE • CALIFORNIA



ABOVE In strength and temperature areas, the A3J uses stainless steel Hi-Lok pins (125,000 psi shear or 220,000 psi tensile) with shanks made to .0005 tolerance; with stainless steel collars, these Hi-Loks can be used to 800°F. Other primary structure uses alloy steel Hi-Lok pins (95,000 psi shear or 160,000-180,000 psi tensile) with shanks made to .001 min. as well as head heights to ±.001 tolerance.

RIGHT Here Hi-Loks are being installed in the A3J rear fuselage with Hi-Lok right angle tooling adapted to a Ratchet Wrench Motor. Other Hi-Lok adaptor tooling is available in straight, extended and offset styles to overcome difficult or tight clearance conditions resulting from the unusual structural configurations of high performance airframes such as the Vigilante.

TRADEMARK REGISTERED. U.S. PATENTS 2,882,773. 2,927,491 AND 2,940,498. OTHER U.S. AND FOREIGN PATENTS GRANTED AND PENDING.



Thor

Everything you want in Torque Control···

and more!

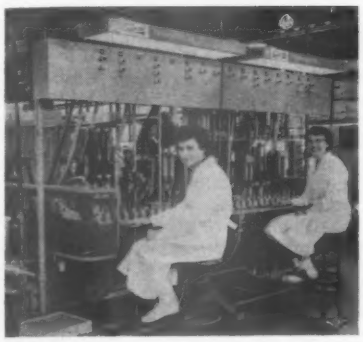
Thor Uni-Tork screwdrivers and nut setters make torque control of threaded fasteners as simple as turning on a light. Operator judgment and guesswork is gone. Uni-Tork snaps out of engagement when desired torque is reached, snaps in again when applied to the work. Thor Uni-Tork air tools have external torque adjustments from 10 to 100 inch-pounds. Available on all Thor air screwdrivers and nut setters and on Thor electric tools. Your Thor factory representative or distributor will show you the tools that think for themselves. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

Use postpaid card. Circle No. 225

WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 74. Just circle the number on the card matching the number following the description. We'll do the rest.



(See 1)

BUILD ASSEMBLY MACHINE FROM STANDARD PARTS

An automated assembly machine can be built from standard parts with a minimum of custom tooling.

The Transferline is cam-actuated and can be modified for model changes at about 15 to 20% of its original cost. It can assemble anything from electronic components to automobile parts.

Standard parts include the frame with full-length machined surface and T-slots for simplified station mounting and station mechanisms. Tooling attached to the mounting blocks is customized, as are the simple plate-type cams.

The machine provides for automatic inspection as assembly progresses.

Gilman Engineering & Mfg. Co., Janesville, Wis.

Use postpaid card. Circle No. 1

(See 2)

DEBURRING TOOL FOR BLIND APPLICATIONS

A deburring tool has been designed for materials of limited thickness. The Type C BurrAway tool fits any spindle and removes feather edges and extruded burrs while being operated from one side of the piece.

The pilot arbor is inserted in the hole. Continuing spindle pressure depresses the spring-loaded blade into the tool to permit hole passage; the blade then returns to cutting position to permit deburring of the opposite side.

Cogsdill Tool Products, Inc., 12980 W. 8-Mile Road, Oak Park 37, Mich.

Use postpaid card. Circle No. 2

(See 4)

AIR VALVE FOR DOUBLE ACTING CYLINDER

A four-way air valve for double-acting cylinders increases efficiency of operation. Novi-matic four-way valve has no loss of air through poppets, while standing. Other than cylinder air, it has no air loss through the exhaust port while the slide valve passes over center of stroke.

The slide valve requires only 6 lbs force to actuate while using 100 lbs line pressure.

Poppet valves for actuating 4-way valve allows air to escape past ball, keeping foreign matter from vital parts.

Novi Tool and Machine Co. 28506 Novi Road, Novi, Mich.

Use postpaid card. Circle No. 3

WELDING HEAD FOR ELECTRONIC ASSEMBLY

Model 1038 welding head is capable of performing single, series or parallel welds for electronic components assembly; joining fine wire, ribbon and foils; and for applications requiring a controllable fastening technique without the use of an interconnecting or bonding material. Ball-race vertical action of the dual upper electrodes permits exact placement of the welds with no electrode wiping action.

Operable with a complete range of stored-energy power supplies, the unit features 500 watt-second power rating; foot-pedal actuation; controllable electrode pressure and automatic firing. The electrode table can be used as either a support for positioning weld materials or as the ground electrode when setup for single or parallel welds.

Single, series or parallel set-ups are accommodated by simple changes in input power connections.

Weldmatic Div., Unitek Corp., 950 Royal Oaks Dr., Monrovia, Calif.

Use postpaid card. Circle No. 4

ELECTRONIC WELDING POWER SUPPLY

An electronic welding power supply has a range selector switch for finer control at low settings and an automatic lockout to prevent premature discharging.

Its range selection switch permits the use of the full meter scale from 2 to 50 and 20 to 500 watt-seconds. Switching from one range to the other automatically discharges the energy stored, changes the meter calibration and allows the power supply to charge to the new setting.

With the VTW-33 power supply's 2½ millesecond pulse width at 500 watt-seconds only the metal interface has time to heat.

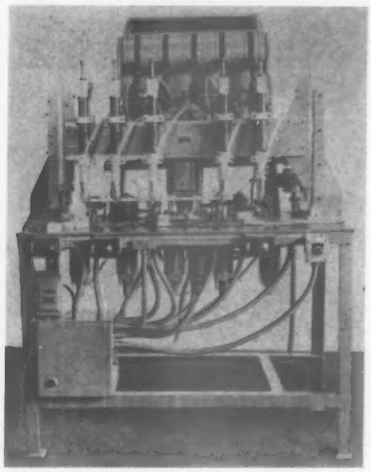
The unit is packaged in two vertical cabinets that will fit any standard production bench.

Hughes Aircraft Co., Vacuum Tube Products Div., 2020 Short St., Oceanside, Calif.

Use postpaid card. Circle No. 5

AIR SCREWDRIVERS ADAPT TO CUSTOM-BUILT UNITS

Automatic screwdriving machines are adaptable to custom-built units with multiple spindles in any number necessary for the assembly desired. The Tru-Tork consists of a single hopper feeding screws into five pneumatic air feed screwdrivers. The drivers, adjustable for center distances, are mounted on a rail with quick acting clamps for adjustments.



This unit drives five hinge screws into a wooden window jamb. It is also equipped with six Spotnails underneath the table. Sliding stops and movable screwdrivers on the rail permit assemblies of five different lengths, both right and left hand, of hinges to window frame.

Single and multiple units have applications in many fields. Units are available with positive jam-free feeding mechanisms for screws, studs, rivets and pins up to 2¼" in length.

Clyde Engineering & Mfg. Corp., 937 East 10 Mile Rd., Madison Heights, Mich.

Use postpaid card. Circle No. 6

COMPLETE ASSEMBLY FUNCTIONS IN ONE WORK STATION

Assembly time, production set up and production lag due to absenteeism are reduced by a new production concept for small assemblies and sub-assemblies.

Called the "total work environment" station, the unit consists of assembly boxes arranged for convenient access to components, a parts positioner, necessary hand tools, soldering iron, and an audio visual unit, which resembles a portable tv set.

Containing 35mm slides, a projector and synchronized sound tape playback mechanism, the unit provides simple step-by-step assembly instruction. Each worker can assemble a complete end product.

Changes or modifications in production are readily made by changing slides and audio instructions.

Modular construction permits end to end joining, and small modifications convert the unit to an end-of-line inspection booth.

Applied Communication Systems, Culver City, Calif.

Use postpaid card. Circle No. 7

PIN INSERTION TOOL FOR PROGRAMMING SYSTEMS

A tool has been developed for inserting both formed and solid taper pins into shielded patchcord programming systems and panels. A single push to insert, and then a single pull on the tool's pull test handle, will properly seat and inspect the taper pin.

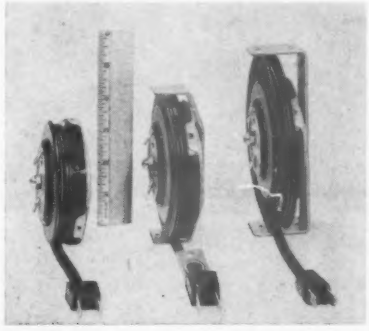
The insertion spring of the tool is calibrated at 18-20 pounds. When this insertion pressure is reached, the spring will "give," and a dished washer is actuated. The pin is then seated.

The pull test device on the tool is calibrated at 6¼ pounds. The poundage is achieved as soon as the pull test handle starts to be displaced from its normal position.

AMP Incorporated, Harrisburg, Pa.

Use postpaid card. Circle No. 8

MINIATURE AUTOMATIC ELECTRIC CORD REELS



A slim profile reel specifically designed for concealed installation in original equipment is 1¼" wide. It is available in diameters of 3¼", 4", and 5". Four to 10 feet 18-2 SPT cord can be accommodated on the reel. Where exterior mounting is required, it can be color-integrated to product.

UL approved, it has a lifetime sealed spring motor, and a three-position gravity action pawl and ratchet. Spark proof, it has a cord-on-cord wind up to insure twist-proof pay out and rewind. Reels are used in such varied original equipment as portable TVs, record players, sewing machines, business machines, etc.

Cordomatic, 17th and Indiana Ave., Philadelphia 32, Pa.

Use postpaid card. Circle No. 9

RB&W FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Technical-ities

By Fred E. Graves

Fastening of "blind hole" joints

Holes which don't go all the way through a solid member must be tapped, of course. In shallow, small holes, in non-critical fastening, and in soft materials thread cutting screws work well and save time.

But fastening large flanges, pressure plates, heads and the like to costly castings needs more precise production. These holes are ¼" diameter and larger, affect design strength.

THREAD EFFECTS

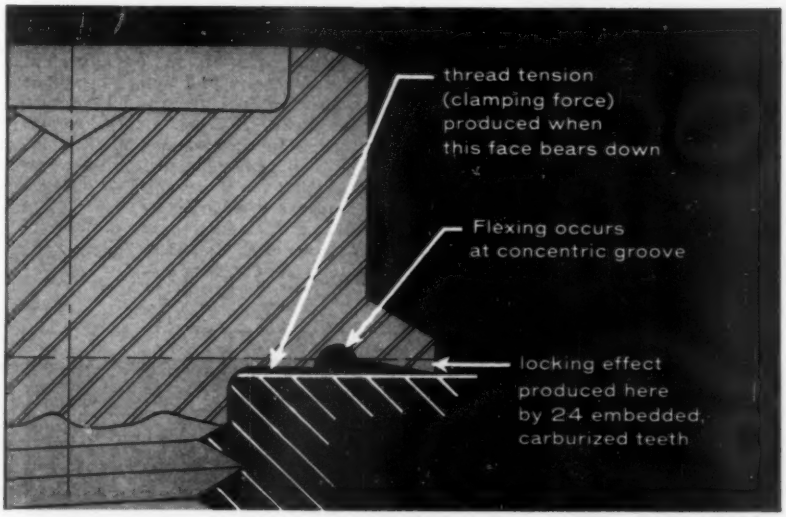
Such holes are coarse threaded. The coarse threads develop more thread strength than do fine threads, also take fewer turns in assembly. Studs go into the holes with an interference thread fit; hex screws with a simpler clearance fit.

Desirably, studs should all be driven to same depth and bottomed. Because of normal manufacturing differences, various mismatched high and low tolerances will cause studs to project unevenly. Assemblers often have to juggle. No such problem exists with hex screws. You just tighten to specified preload. And there's no double driving operation, as with stud plus nut.

STRENGTH OF BLIND JOINTS

Tapped holes behave like nuts. Their threads adjust elastically and plastically to distribute stress and develop high thread tension. Is this harmful in repeated disassemblies? Not at all. Hex screws have been installed 50 times in cast iron test blocks, then tightened to failure without damage to tapped holes.

Clamps like a hex screw Grips like an anchor


thread tension (clamping force) produced when this face bears down
Flexing occurs at concentric groove
locking effect produced here by 24 embedded, carburized teeth

Tensilock® screws offer you the ideal combination of high clamping force and high locking power.

While a standard high strength hex screw can be tightened to a higher thread tension, its off-torque is less than its on-torque.

ANCHORED IN PLACE

The *"Tensilock"* screw features ratchet action teeth formed at an angle which will cut driving effort to permit you to utilize more of the full strength of screw. At equal driving torque, it not only develops 90% of the strength of a high strength hex screw but also takes *25% more torque to loosen than to tighten.*

Because of the flange's concentric groove, it flexes, allows the screw to bear down solidly on its seat and develop a high level of thread tension. At the same time the teeth embed themselves, are aided in maintaining their grip by pressure of the spring-action flange.

MAKES GOOD FRICTION-TYPE JOINT

Clamping force from Tensilock fasteners is sufficient to prevent slippage of fastened members where holes are oversize or eccentric. Grip of the teeth keeps fasteners tight under conditions of vibration or cyclic temperature changes. RB&W *"Tensilock"* Nuts also available. Write for Bulletin TL-2. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

® Registered and Patented

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa., Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

Use postpaid card. Circle No. 236

LP-GAS OUTFIT FOR WELDING, BRAZING

A packaged cutting-heating-welding-brazing outfit is specifically for use with LP-Gas. "Big 98LP" is a companion to "Big 98" which has been on the acetylene market for over two years.

The kit contains a new braze-welding tip which makes the outfit completely functional for use with LP-Gas. This tip does fusion welding of metals up to 14 gauge.

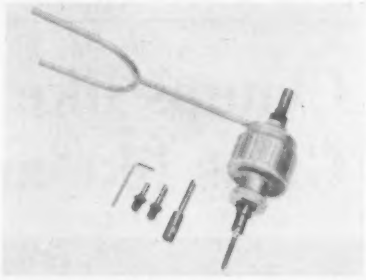
The LP cutting tip included cuts up to 4" metal, and the cutting assembly accepts all of the cutting tips in the line.

A mild-range soldering tip and adapter for use with LP-Gas and air are included.

Smith Welding Equipment Corp., 2633 Fourth Street S. E., Minneapolis 14, Minnesota.

Use postpaid card. Circle No. 11

CONVENIENT POWER TAPPING HEAD FOR TOOL MAKERS



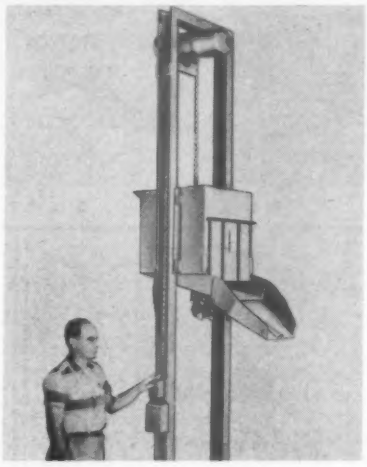
Power tapping is made convenient for tool makers with a tapping head that chucks in a drill press in 10 seconds.

The Babco 825 has a 5 to 1 gear reduction for increased torque. A ½" round shank fits in the drill press chuck. An adapter for use with a ¼" electric drill makes it a handy tool for pattern makers and cabinet shops.

Babcock Mfg. Co., 5632 Shafter Ave., Oakland 18, Calif.

Use postpaid card. Circle No. 12

VIBRATOR MOVES PARTS FROM HOPPER ELEVATOR



A hopper elevator, designed to facilitate the loading of parts into the bowls of vibrating parts feeders, can also be used for loading purposes in conjunction with any automatic or semi-automatic parts processing system.

These hopper elevators provide an easier, faster method of supplying parts —eliminating heavy manual lifting and subsequent personnel accidents.

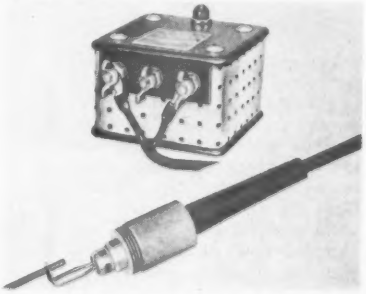
An electromagnetic vibrator keeps the parts moving freely out of the hopper and over the chute. There are no belts, clutches, or other moving, wearing parts.

Elevators are available with four hopper sizes, either 3, 5, 7, or 10 cubic foot capacities with supporting structure any height in the 10 to 20 foot range.

Syntron Co., 820 Lexington Ave., Homer City, Pa.

Use postpaid card. Circle No. 13

HIGH SPEED PRODUCTION WIRE STRIPPER

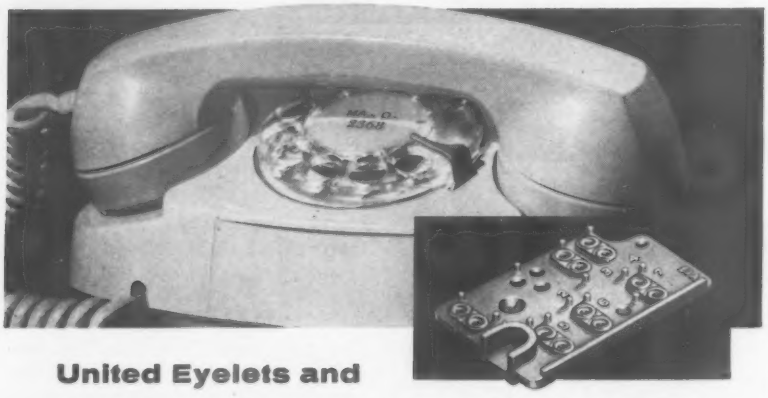


A wire stripper of a cool, light, highly flexible handpiece and a Nichrome cutting element is designed to be used on the job or for bench work with optional foot control.

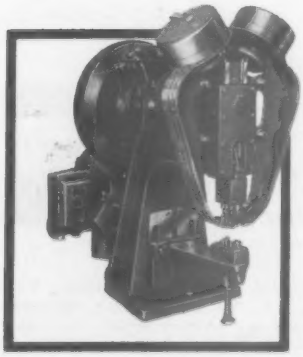
The Glo-Melt wire stripper is designed for production jobs where speed and quality are important factors. Stripping of all plastic wire is accomplished with a simple twist of the wrist.

Wassco Glo-Melt Div., American Electrical Heater Co., 6110 Cass Ave., Detroit 2, Mich.

Use postpaid card. Circle No. 14



United Eyelets and Eyeleting Machines Keep this Princess on Constant Call



The new Princess telephone — a product of the Western Electric Company — is an achievement in communication design INSIDE as well as out, thanks in part to a United Eyeleting Machine that automatically feeds and sets six twin United Eyelets in a plastic insulating terminal board no bigger than a cigarette lighter.

Accurate alignment of the setting bar and an especially rigid frame — unique with the Model F United Eyeleting Machine — brings uniform pressure to bear on all six twin United Eyelets scattered over a broad pattern range.

If you want faster production using greatly simplified setups of multiple mechanisms plus absolute reliability in multiple eyelet patterns, call or write your nearest United sales office.

United

UNITED SHOE MACHINERY CORPORATION

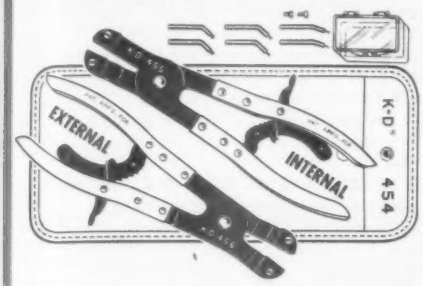
140 Federal Street, Boston, Massachusetts

Liberty 2-9100

us c-07

Use postpaid card. Circle No. 237

SNAP RING PLIERS WITH INTERCHANGEABLE POINTS



Snap ring pliers with interchangeable points offer a wide range of applications. The No. 454 set includes both internal and external snap ring pliers.

Set in the hex jaws of the plier by a round set screw, the hex points won't twist. The point ends are reverse tapered for better grip in the ring holes.

K-D Tools, 526 N. Plum Street, Lancaster, Pa.

Use postpaid card. Circle No. 15

AUTOMATIC STUD FASTENER USES REVOLVER PRINCIPLE

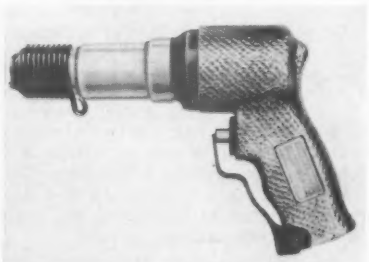
An automatic fastening tool for securing studs to steel and concrete makes eight successive rapid firings before reloading.

Quiet and speedy, the revolver-like tool can drive up to 16 studs a minute. Columbia-matic 8 permits savings for general contractors, electricians, air conditioning, sheet metal, plumbing installations and many others which require a quick, efficient method of fastening nails, studs and straps into steel, concrete or wood.

American International Tool Corp., Miami Beach, Fla.

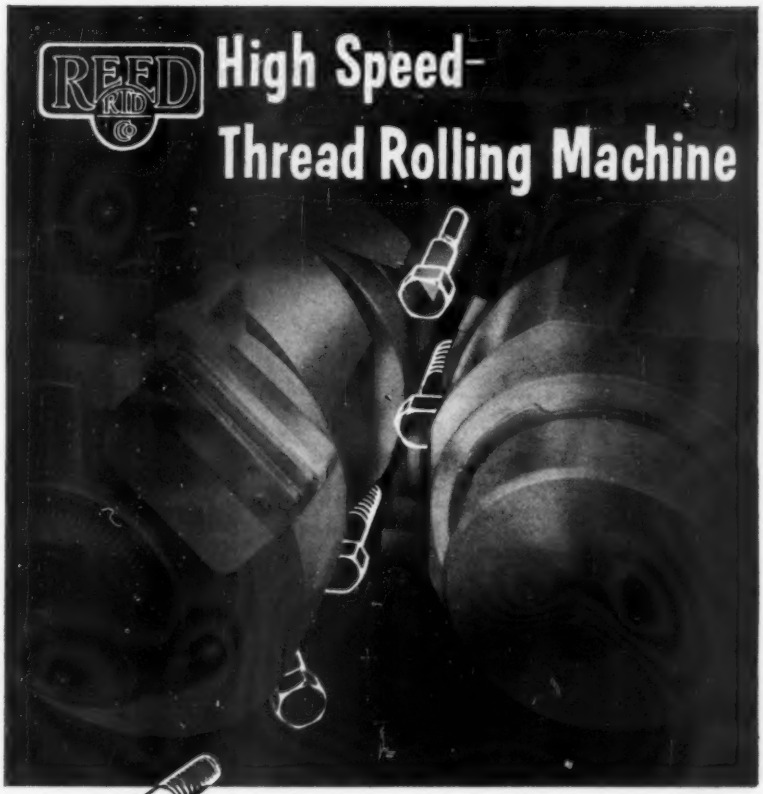
Use postpaid card. Circle No. 16

AIR HAMMER SETS UP TO ¼" RIVETS



A riveting air hammer sets up to ¼" soft iron or aluminum rivets.

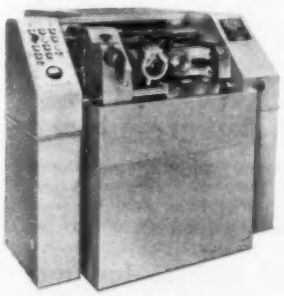
Model SP-700 has a metering trigger that delivers 0 to 2800 controllable blows per minute. There are over 15 different chisels available for the unit



Up to 200 Pieces Per Minute

with cylindrical single revolution dies

The Reed B910 Cylindrical Die Thread Rolling Machine is a rugged general purpose two-die type machine for high speed production. This machine is adaptable to a wide range of work using single revolution dies where the parts are rolled within one revolution of the dies. Diameters $\frac{3}{16}$" through 1" and thread lengths up to $6\frac{1}{2}$" long may be rolled.



The machine is simple to set up and convenient to operate. Both semi- and completely automatic work-handling equipment is available to take full advantage of the high production capabilities of the machine.

Write for Machine Bulletin B-910-1

REED RTD B-910-1

REED ROLLED THREAD DIE CO.

Specialists in Thread and Form Rolling Tools and Equipment

HOLDEN, MASSACHUSETTS, U. S. A.

Sales Offices in: Buffalo, Chicago, Cleveland, Compton, Calif., Denver, Detroit, Englewood, N. J., Houston, Indianapolis, Milwaukee, Montreal, New York City, Phila., Pittsburgh, St. Louis, Syracuse, Toronto

Use postpaid card. Circle No. 238

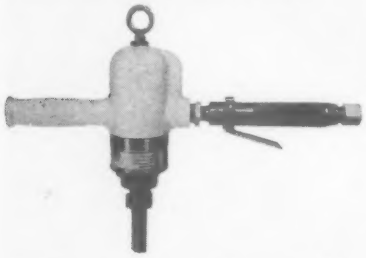
and it can be used to cut panels, bust rivets and bolts, remove drum lids, star drill, etc.

The hammer weighs 7½ lbs. and measures 8" long.

Superior Pneumatic and Mfg., Inc., 13800 Enterprise Ave., Cleveland 35, Ohio.

Use postpaid card. Circle No. 17

HIGH SPEED, HIGH TORQUE VERTICAL NUT SETTERS



A vertical nut setter, having a bolt capacity of ⅜", offers high torque, high speed and efficient muffled exhaust for low level noise.

The 16F-5 nut setter delivers fast run down, with final high torque setting of the bolt. Side handles provide ease of positioning and absorb torque reaction. Cast aluminum motor housing gives light weight.

Gardner-Denver Company, Quincy, Illinois.

Use postpaid card. Circle No. 18

OPTICAL SYSTEM TO DRILL PRINTED CIRCUIT BOARDS

An optical system for drilling holes in printed circuit boards assures positive accuracy.

The equipment consists of the No. 33 optical package (power supply, condensing system, front surface illuminator, projection system, hood and screen assembly) and a stand and drill.

In operation, the drill point is lined up on the cross hairlines of the screen of the projector. The printed circuit board is placed on the work surface of the table under the projector. The desired hole location dots are projected on the screen and lined up in the center of the cross lines. It is then actuated to bring the rocker clamp down to secure the board and bring the drill up through the drill bushing and the printed circuit board. The hole is drilled in exact position in the board.

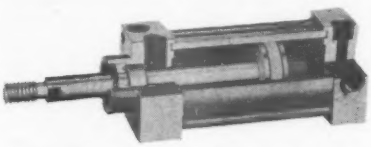
Accuracy can be selected by choosing magnifications from 10X to 100X. At 100X, accuracy to .0001" is possible.

Because the work area is magnified, the operator sees exactly where to drill the holes.

Stocker & Yale, Inc., 44 Green St., Marblehead, Mass.

Use postpaid card. Circle No. 19

COMPACT AIR CYLINDERS FOR ASSEMBLY MACHINES



One-inch-bore air cylinders designed especially for high-speed assembly machines and other heavy-duty applications in small space help eliminate awkward maintenance under cramped quarters. Designated as Series B cylinders, they are rated at 200 psi.

The Teflon rod seal-wiper combination and leakproof barrel seals can be removed without disassembling the cylinder.

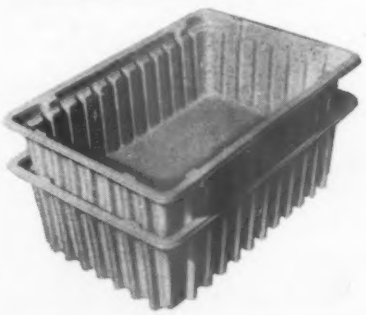
Cylinder efficiency is increased because the piston seals require no lubrication. Piston seals are held against the cylinder by O-ring expansions.

Eight standard strokes ranging from ½" to 5" are available, with front flange, rear flange, trunnion, clevis, or foot mountings.

Hydro-Line Mfg. Co., 5681 Pike Rd., Rockford, Ill.

Use postpaid card. Circle No. 20

PLASTIC TOTE BOXES NEST BY HALF TURNS

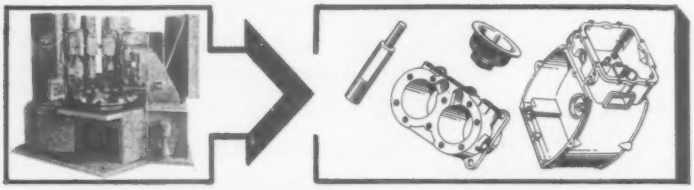


Standard and compartmentalized plastic tote boxes and containers will stack and/or nest, by a half-turn. This eliminates the projections and lugs normally used to accomplish the combined stacking-nesting feature.

All standard sizes and shapes and special forms and sizes up to 70" x 40" x 24" are available. The new high-density linear polyethylene is blended, extruded, and vacuum-formed.

This plastic material also provides diversity of application; unaffected by

GREATER PRODUCTIVITY
AND
MORE ACCURACY
WITH
LESS MANPOWER



CLEVELAND TAPPING MACHINE COMPANY'S

... line of standard and special machines for drilling and tapping are an integral part of the Townsend line of full-range machining operations.* Greater economy and production efficiency from Townsend qualimatic machines has made Townsend of Hartford a leader in qualimatic mechanization. Our sales engineer will see you at your convenience. Write, wire, or phone.

Better PERFORMANCE and MORE PROFIT for you!

*Metal sawing machines, duplex spline millers, spring presses, drilling machines, high speed shavers, riveters, automatic screw machines, special machines.

TOWNSEND OF HARTFORD
QUALI-MATIC MACHINES

THE H. P. TOWNSEND MANUFACTURING CO. · BROOK ST., WEST HARTFORD 10, CONN.

Use postpaid card. Circle No. 239

any known solvent, solution, or chemicals at normal room temperatures, and is unaffected by temperature variations from —40° F to 250° F.

Stauffer Laboratories, Inc., Plastics Div., 1919 Vineburn Ave., Los Angeles 32, Calif.

Use postpaid card. Circle No. 21

FLIPPER-TYPE CLAMP GIVES MAXIMUM CLEARANCE

One of four flipper clamps developed for use on fixtures where maximum clearance for stock removal is required is Model 326.

The base design allows the clamp to be mounted in a variety of positions—on the side, or even under the fixture. Rivets and bushings are hardened for long life, and the complete clamp is cadmium plated.

Wespo Div., Vlier Engineering Corp., 26935 W. Seven Mile Rd., Detroit 19, Michigan.

Use postpaid card. Circle No. 22

HAND OPERATED ULTRASONIC PLASTIC WELDER

Using only high frequency sound waves, cold bonding, threadless stitching, sealing or welding of plastic films and synthetic woven and non-woven fibers, positive vapor and air tight joints can be obtained.

There is no distortion or chemical change in the material, since no heat or dielectric currents are used.

Guiding the Sewnar transducer which resembles an oversized ball point pen, gently across the material being sealed causes a high strength interlocking of molecules on the surface of the material. The transducer is designed for hand operation, or fixture mounting for automatic sealing.

Ultrasonic Industries, 141 Albertson Ave., Albertson, N.Y.

Use postpaid card. Circle No. 23

HUBBELL COLD HEADING

MAKES THEM FASTER AND BETTER

Small fasteners like these Hubbell cold headed parts represent an area of saving often overlooked by management, who give careful attention to the cost and design of major components and little or none to the parts that hold them together. Yet here is the area where savings can be effected most easily and quickly.

Why pay for special tolerances and secondary operations when Hubbell engineers can design and mass produce a cold headed part that is stronger, cheaper and more uniform. For example, all of the above, and thousands more like them, have been specially designed for Hubbell cold heading. And each one helped to make the end product faster and better.

Investigate for yourself. Simply send us a blueprint of the part or a sample for analysis. Our engineers will gladly estimate.

This quality can be your greatest production economy For standards or specials, call Bridgeport, EDison 3-1181.

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

Quality FASTENERS

HARVEY HUBBELL, INCORPORATED

Machine Screw Department, Bridgeport 2, Connecticut

See the Hubbell Fastener Catalog in Sweet's Product Design File 7/Hu.

Use postpaid card. Circle No. 240

LOWER FASTENER COST

with JOB-DESIGNED COLD HEADED PARTS and FASTENERS

what The most important consideration we can point out to the designer or purchaser of fasteners and small parts is that any part which can be machined from rod stock is also potentially available from the cold heading manufacturer. This technique offers speed of production, without scrap loss, plus superior strength and appearance for low cost and high design efficiency.

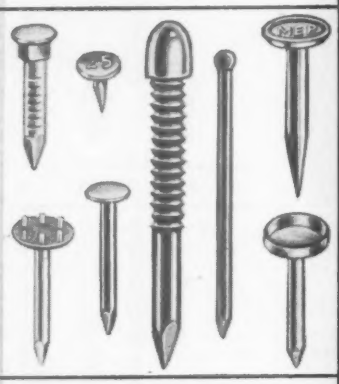
why The designer need not be restricted to standard fastener sizes when they do not meet the requirements of his application. It is often much less expensive to specify a rivet, nail or screw to meet the task exactly as the application requires, than it is to compromise its function for the sake of "standards". In this regard, we offer the equally important advantages of flexibility according to our customers' design changes and production by high speed, quantity techniques. While the really spectacular advantages in cost show up in runs of several thousand pieces, we are also able to take care of your short run requirements. We welcome and expect manufacturers to come to us for advice and assistance concerning their fastener problems.

how Given complete specifications, including a drawing and an idea of the application, we can quickly tell you whether or not it will be advantageous to have your fastener or part JOB-DESIGNED by HASSALL. The remaining important aspect of our service to you is the ability to get into production quickly and make prompt shipment.

Send today for your copy of our new booklet "What the Designer Should Know About Cold Heading".

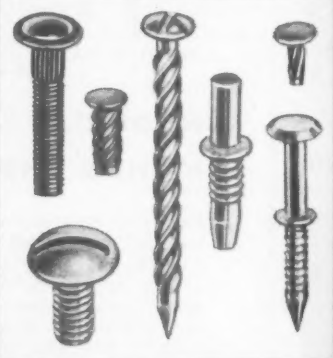
RIVETS

It is sometimes difficult to realize that the proper rivet of the proper metal designed specifically for your application often costs less and is more easily obtained than so-called stock sizes. JOB-DESIGNED rivets — countersunk, shoulder, tubular, etc., in any metal—have solved countless problems for our customers.



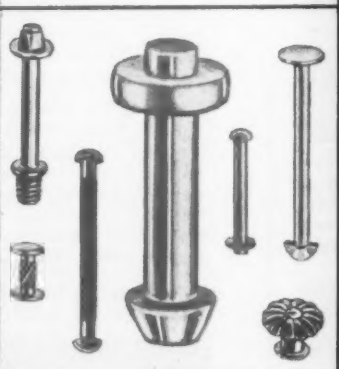
NAILS

Manufacturer of "standardized specials" would be an apt description of HASSALL products in this field. Many of the nails were JOB-DESIGNED for a specific application but universal acceptance of their extremely functional advantages has put them in the standard classification.



THREADED PARTS

There is a wide scope of design possibilities available when your fastener or part is threaded, fluted, or knurled by the high speed cold rolling technique. The strength characteristics of the part are not penalized in this process as in the case of cutting the surface grain by machining.



DOUBLE HEADING

The old saying, "Two Heads are Better Than One", may well apply to your part or fastener requirements. The savings in scrap when compared to machining from bar stock are often spectacular for obvious reasons. A glance at the illustration may bring to mind possibilities for parts you have considered previously only for screw machining.

Manufactured by

JOHN **Hassall** INC.

P. O. Box 2217
Westbury,
Long Island, N. Y.

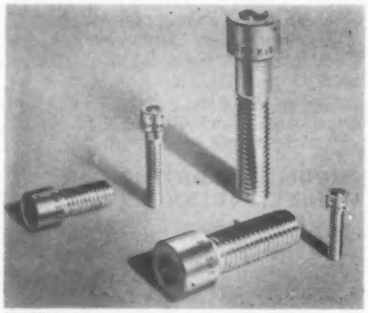
SINCE 1850

Hassall

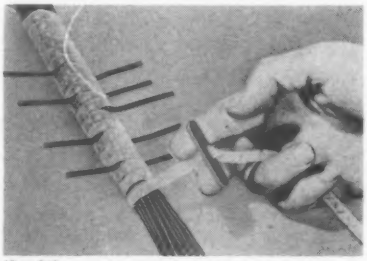
Use postpaid card. Circle No. 241

WHAT'S NEW IN FASTENING AND JOINING

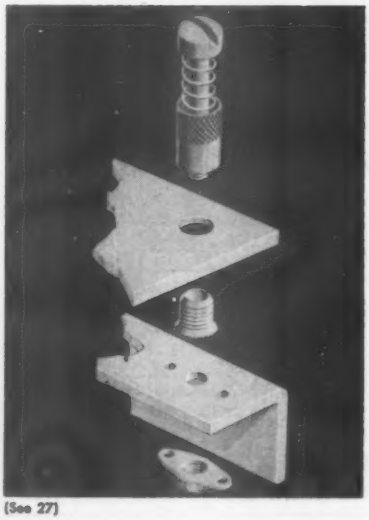
For further information on any of the fasteners or methods listed here, use the handy postpaid card opposite page 74.



(See 25)



(See 26)



(See 27)

FASTENERS FOR CRITICAL STRENGTH APPLICATIONS

High fatigue tension fasteners for critical high strength industrial applications have twice the fatigue strength of their standard counterparts.

Basically socket head cap screws, the Unbrako K-series fills a void in the fastener field between standard aircraft and missiles superbolts and the standard fasteners.

Typical applications for high fatigue socket screws include aircraft accessories, ground support equipment, critical pumps, turbines and electrical alternators, high speed machine tools and high-impact machinery.

The endurance limit at 8,000,000 load cycles is 40,000 psi compared to 20,000 psi for standard socket screws.

The series is made in standard sizes from No. 3 to ½", fine or coarse thread. They are cadmium plated to QQ-P-416.

Standard Pressed Steel Co., Box 1121 Jenkintown, Pa.

Use postpaid card. Circle No. 25

SPIRAL CABLE WRAPPINGS FOR WIRE BUNDLES

Two additional sizes of spiral cable wrapping have been added to the line of spirally cut wiring tube for flexible electrical harnesses. Three standard sizes are now available for wire bundles from 1/16" to 4". Spiral wrapping provides a sheath for mechanical protection wherever required for flexible cables. A cable forming wiring tool is supplied for easier application with each order of wrapping.

Panduit Corp., Dept. AE 3, 14461 Waverly Ave., Midlothian, Ill.

Use postpaid card. Circle No. 26

SELF RETAINED FASTENER FOR ELECTRONICS

A self retained fastener suitable for electronic packaging eliminates the possibility of lost or misplaced screws falling into the electronic circuitry.

Attached to the panel or cover at all times, no special tools or mechanical swaging is required. It is completely flush when in the unlocked position, and can be adjusted to ⅛" for different panel thicknesses. Available in various thread sizes with slotted, knurled, Phillips or hex socket head styles.

Calfax Inc., 115 Main St., El Segundo, California.

Use postpaid card. Circle No. 27

FASTENER COATED TO RESIST HEAT AND SALT AIR

Results of a three-year test on Bethalume coated steel fasteners in a highly corrosive industrial atmosphere have been disclosed by Bethlehem Steel Co.

The coating protects the fasteners completely, by immersing the product in a molten bath of pure aluminum.

Test racks which exposed such aluminum-coated products for three to five years at locations in Hawaii and on the West Coast revealed that the coating is ideally suited for application in marine atmospheres.

Coated fasteners also have great resistance to heat corrosion at elevated temperatures. Tests at 1600° F for as long as 1000 hours have shown absolutely no scaling of the protected steel.

Especially recommended for aluminum fabrication, it is non-galling and can be applied to all types of steel fasteners. The coating has been applied successfully on units from ¼" diameter and up, and in lengths up to about two feet.

Bethelehem Steel Co., Bethlehem, Pa.

Use postpaid card. Circle No. 28

ADHESIVE GIVES HIGH BOND STRENGTH

A two-component, contact-pressure epoxy adhesive that can be cured at room temperature to provide high bond strength is furnished as a solvent-free, non-volatile, medium-thick paste with a two-hour pot life. It meets MIL-A-8623, Type II, the federal specification for the aircraft industry.

The adhesive, formulated for uses where it is impractical to apply heavy

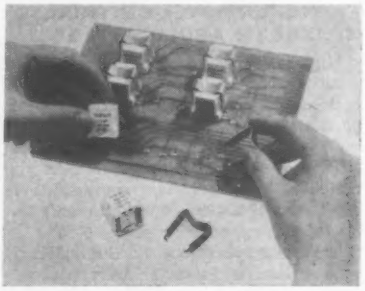
pressure or heat for hardening, was primarily intended to join together aluminum, steel, brass, copper, magnesium, and combinations of these metals. It is also being used to bond wood, glass, rubber, and plastics (except polyethylene, vinyl, and Teflon) as well as reinforced plastics such as laminates of polyester and fibrous glass.

Tests of an aluminum-to-aluminum bond show tensile shear strength of 3,900 psi after 10 minutes at 180 degrees F, 3,100 psi after 80 minutes at 150 degrees F, and 2,650 psi after two days at room temperature. Tensile strength is cited as 8,300 psi, and hardness as 83 Shore D.

Marblette Corp., 37-31 Thirtieth St., Long Island City 1, N.Y.

Use postpaid card. Circle No. 29

PERMANENT MAGNET RELAY HAS PRINTED CONTACTS



A permanent magnet printed contact relay series employs preadjusted bar contacts in an armature and moving contact assembly which make direct contact with conductors on the user's printed circuit board. It is applicable to printed circuit component insertion techniques. This departure from conventional printed circuit relay types is designed to save space and weight and to speed assembly time.

Switching combinations of up to three-pole double-throw may be achieved by proper arrangement of the conductors printed on the user's printed circuit board.

A ceramic permanent magnet is the heart of the magnetic motor assembly. Absence of springs or mechanical linkages eliminates the need for adjustment.

Power consumption for a three-pole relay is 500 milliwatts at 6, 12, or 24 volts, D.C. Operating time is 10 milliseconds. Contacts are rated from dry circuit to 2 amp. Weight 0.8 ounce. Dimensions: ⅞ x ⅞ x 13/16 inches, with no clearance required for terminal connections.

Components Division, Executone Inc., 47 Austel Pl., Long Island City 1, N.Y.

Use postpaid card. Circle No. 30

CLUSTER STAMPING MAKES SILVER BRAZING PREFORMS

Close cluster stamping, for producing precise preforms of precious metals for the semiconductor industry, is now also being used successfully to produce silver brazing preforms.

The technique provides the following advantages:

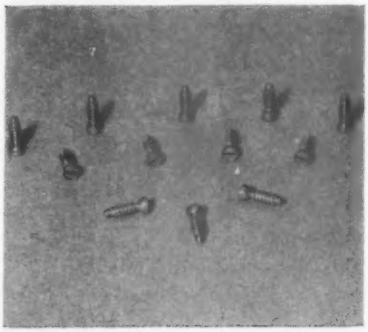
Multiple dies tightly clustered on precision presses tend to increase the output of usable preforms from a given piece of silver strip.

This new close cluster method enables holding tolerances to as fine as .0005".

Alloys Unlimited, Inc., 21-01 43rd Ave., Long Island City 1, N.Y.

Use postpaid card. Circle No. 31

CHROMIUM COATING FOR MINUTE FASTENERS



Miniature fasteners can be treated with a new approach to chromium diffusion of metal, which increases the resistance of carbon steel to heat, corrosion and wear.

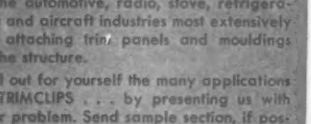
Unlike plating or coating, the process, called Alphatizing, produces a true alloy. There is no bonding agent or bonding problem. The bottom of

TRIMCLIP®

over forty years of industry leadership

Do you have a fastener problem? TRIM-CLIPS have been widely known and used in the automotive, radio, stove, refrigeration and aircraft industries most extensively for attaching trim panels and mouldings to the structure.

Find out for yourself the many applications of TRIMCLIPS . . . by presenting us with your problem. Send sample section, if possible, otherwise full description and details.



GAGNIER
FIBRE PRODUCTS COMPANY
10151 Capital, Oak Park, Michigan
Phone: JOrdan 6-7366

Use postpaid card. Circle No. 242

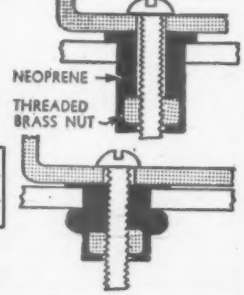
AIR-TIGHT, WATER-TIGHT BLIND FASTENER

"WELL-NUTS"* isolate vibration • space and fasten simultaneously • accept conventional threaded fasteners • will not crack or mar porcelain or glass. Send for literature and samples.

*Patented

STANDARD SIZES

CATALOG NUMBER	6S	10S	G-1032	10SL	1/4S	D-1429	Z3816
STANDARD THREAD	6-32	10-32	10-32	10-32	1/4-20	1/4-20	3/8-16
LENGTH	7/16"	33/64"	5/8"	1"	37/64"	41/64"	45/64"



ROCKWELL PRODUCTS CORPORATION
146 Central Ave., Dept. B, Newark 3, N.J., MArket 3-7650

Use postpaid card. Circle No. 243

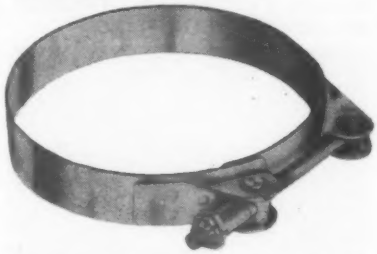
threads, and even small imperfections are penetrated and treated.

Conventional heat treating furnaces are used for the process, and equipment is largely dictated by the size and shape of the article to be treated.

Alloy Surfaces Co., Wilmington, Del.

Use postpaid card. Circle No. 32

BAND CLAMP IS READILY REMOVED



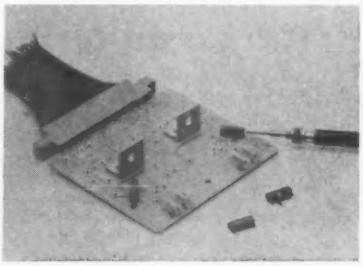
Flat band clamps are made of high tensile stainless steel with standard A or AN self-locking nut. Uniform peripheral clamping action is assured with balanced design and construction. Clamp diameters range from 2¼" to 10".

The Type 10QL clamp meets rigid military standards for hose and duct connections where easy installation and fast removal are important. Latch construction gives positive assurance against accidental disconnect.

Wittek Mfg. Co., 4305 W. 24th Place, Chicago 23, Ill.

Use postpaid card. Circle No. 33

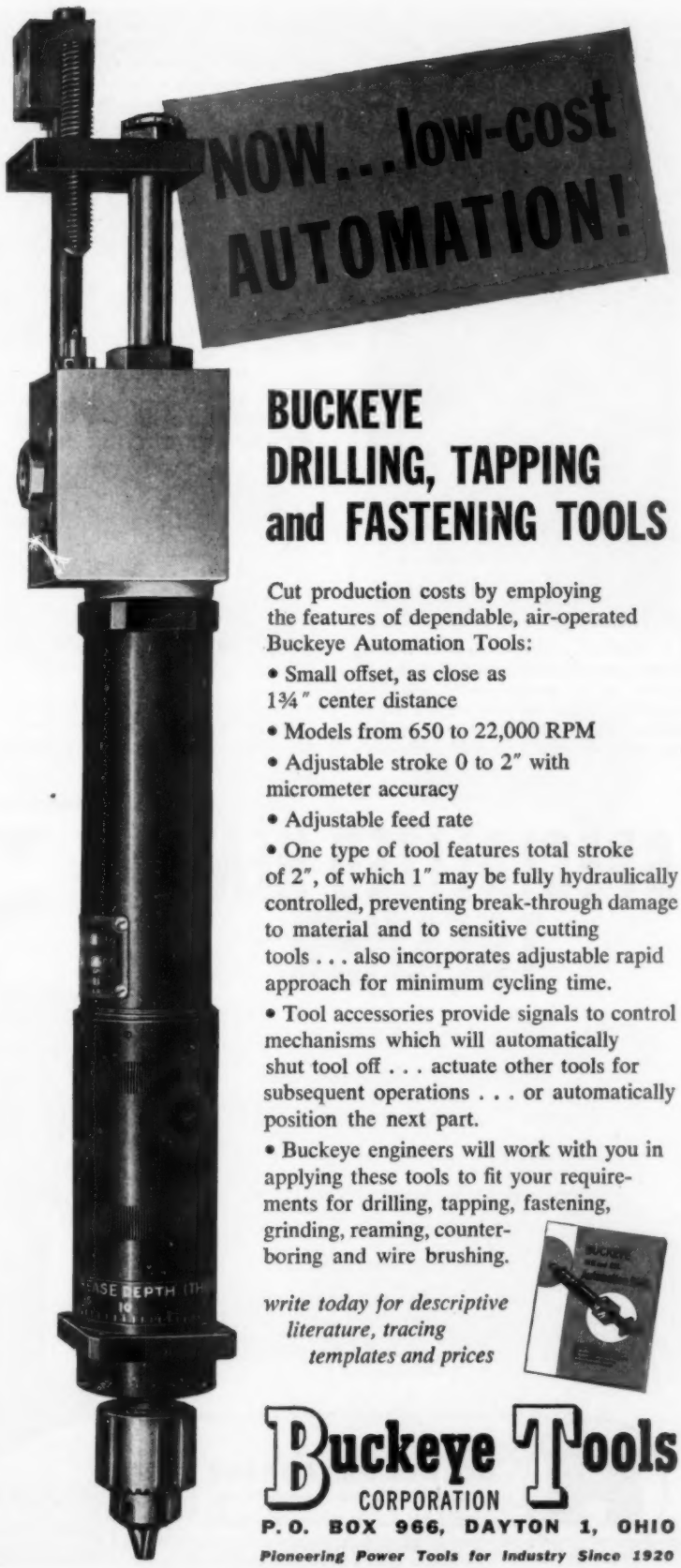
TESTS PRINTED CIRCUITS WITH STANDARD RECEPTACLE



Test receptacle will receive the standard .080 test probe used with ammeters, voltmeters, ohmmeters and other test equipment, to test printed board circuits without interrupting operating currents. Receptacles are used during final production, check-out and field services of commercial and military test equipment, missile control equipment, computers and business machines.

Each receptacle is available with two or three-leg mount. Leg mounts "V" shaped to promote solder wicking, will hold the receptacle in place from assembly to soldering.

Receptacle legs will fit any .052 hole. Two-leg mount is made for center-to-center hole dimensions of .400 and the three-leg mount for dimensions of .300 by .200. Receptacle may be used in plated, unplated or eyeleted holes. Dimensions from the center of the re-



BUCKEYE
DRILLING, TAPPING
and FASTENING TOOLS

Cut production costs by employing the features of dependable, air-operated Buckeye Automation Tools:

- Small offset, as close as 1¾" center distance
- Models from 650 to 22,000 RPM
- Adjustable stroke 0 to 2" with micrometer accuracy
- Adjustable feed rate
- One type of tool features total stroke of 2", of which 1" may be fully hydraulically controlled, preventing break-through damage to material and to sensitive cutting tools . . . also incorporates adjustable rapid approach for minimum cycling time.
- Tool accessories provide signals to control mechanisms which will automatically shut tool off . . . actuate other tools for subsequent operations . . . or automatically position the next part.
- Buckeye engineers will work with you in applying these tools to fit your requirements for drilling, tapping, fastening, grinding, reaming, counterboring and wire brushing.

write today for descriptive literature, tracing templates and prices

Buckeye Tools
CORPORATION
P. O. BOX 966, DAYTON 1, OHIO
Pioneering Power Tools for Industry Since 1920

Use postpaid card. Circle No. 244

ceptacle to the housing bottom: .125 for two-leg mount; .125 and .375 for three-leg mount.

Receptacle is double ended for either-end probing. It has a formed barrel and is recessed into the housing to prevent shorting or flash over.

AMP, Inc., Eisenhower Blvd., Harrisburg, Pa.

Use postpaid card Circle No. 34

METAL SURFACES TINNED WITH AEROSOL SPRAY

A product, which consists of tinning metals, chemical cleaner and a flux is packed in an aerosol spray can. The material is first sprayed on the metal surface. Heat is applied and at soldering temperatures a smooth, complete coating of tin appears on the metal. Tin Swipe may also be sprayed on hot metal and the coating of tin appears as it is sprayed.

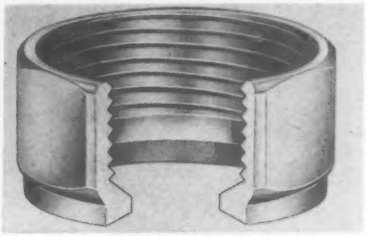
It is not necessary to prepare the surface beyond wiping off accumulations of dirt and grease. On soldering copper or galvanized fittings, it is sprayed on the end of the tubing or pipe. The inside of the fitting is also sprayed and the pieces joined.

On hundreds of test joints, a stronger bond than ordinary fluxes and coverage of solder inside the joint averaged over 97%.

Wright Manufacturing Co., 1900 Euclid Ave., Cleveland 15, Ohio.

Use postpaid card. Circle No. 35

COMPRESSION NUTS MADE BY IMPACT EXTRUSION



A line of compression nuts is the first of a series of new products manufactured by the impact extrusion process and threaded. They were formerly made by conventional methods.

These compression nuts are available in aluminum, brass, steel and stainless steel in all finishes in a full range of commercial sizes.

Jacobson Nut Mfg. Corp., Box 177, Kenilworth, New Jersey.

Use postpaid card. Circle No. 36

NYLON FASTENERS OFFERED IN SMALL QUANTITIES

Users of molded nylon fasteners are assured prompt delivery of small lots (as few as 10 of a size) of machine screws, nuts, washers and screw insulators by a specialized service. This eliminates waste of money and parts when just a few pieces are needed for repair, research and development, experimental, prototype and general laboratory and factory use.

SPECIALIZED HEAT TREATING

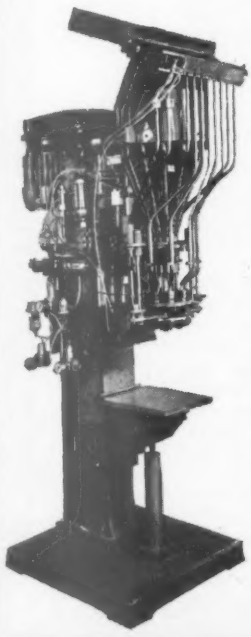
Standardizing in the heat treating of cold heading tools for the fastener industry ... coast to coast. For consistent, long-life tool performance, count on Header Heat Treat quality.

Send your part print,
or call for quotation.

HEADER HEAT TREAT
Division of Howell-Penncraft Corp.
35815 Clinton • Wayne, Michigan
PArkway 1-8500

Use postpaid card. Circle No. 245

this machine will drive up to 10 screws at one time . . .



. . . reducing assembly costs and improving quality. Built for high production jobs where a fixed set up is practical, this multiple spindle screw driving machine automatically feeds screws from a hopper and drives them to a predetermined torque. Evenly distributed pressure eliminates stresses caused by driving home one screw at a time. A simple sliding fixture positions work pieces accurately.

Machine illustrated shows application of multiple spindle screwdriving to assembly of electric power drills.

Send a sample of your assembly and a list of your requirements. We will be happy to show you how multiple spindle screw driving can be applied to your job.

COOK & CHICK COMPANY
2415 West 24th Street Chicago 8, Illinois

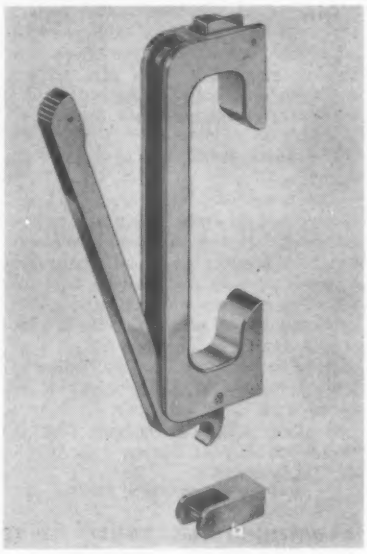
Use postpaid card. Circle No. 246

Machine screws, with binding, round, fillister, flat, oval, washer and set screw heads, come in more than 60 lengths in thread sizes from No. 0-80 thru ¼-20. Hex nuts, in 10 thread sizes from No. 2-56 thru 5/16-18. 5 washer sizes range from No. 4 thru ¼", and 6 screw insulator types from No. 4 x 3/16 thru ¼" x ⅜".

Machine Parts Supply Company, 13 East 37th St., New York 16.

Use postpaid card. Circle No. 37

ELECTRONIC CHASSIS LATCH OVERCOMES PIN FRICTION



A lightweight, electronic chassis latch designated as 40L is being manufactured under Camloc patents and license from the Martin Company under patents pending. The latch is designed with an integral, easy operating lever in the fixed handle which provides positive injection and ejection forces to overcome pin friction on all types of plug-in equipment. The operating lever stows flat within the fixed handle when not in use. It has a working load of 400 lbs. and an ultimate load of 600 lbs.

Camloc Fastener Corp., Dept. 2A, 14 Spring Valley Rd., Paramus, N.J.

Use postpaid card. Circle No 38

Answer to problem on pg. 50.
The circle on the face of the clock is divided into 60 equal parts. The minute hand travels around the circle at a speed of 60 spaces per hour. The hour hand follows it at a speed of 5 spaces per hour. So the minute hand gets ahead at a speed of 55 spaces per hour. The two hands will be together again when the minute hand is a full lap, or 60 spaces, ahead. To get that far ahead will take 60/55 hours, which is 1 1/11 hours, or 1 hour and 5 5/11 minutes. So the hands will be together at 5 5/11 minutes past 1 o'clock.

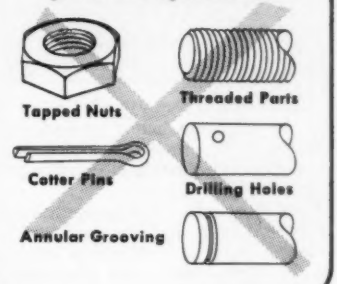
Investigate this wide choice of

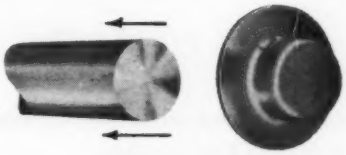
PUSHNUT® FASTENERS

to speed up and cut costs of Assembly

- **SIMPLY PUSH ON** plain rods, axles, studs or pins.
- Easy, fast assembly with manual tools or high speed air hammers.
- Tight, vibration-proof grip.

Eliminate these costlier parts and operations





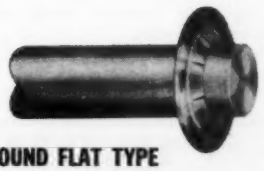
WASHER CAP TYPE

Style PW. Covers rod ends with smooth, rugged cap. Made of one-piece, heavy gauge spring steel with powerful gripping action. Always align perfectly. Various designs and finishes in sizes for 1/16", ¼", 5/16", 3/8", 7/16" and ½" dia. unthreaded rod, wire and studs.

Style PC Style PK

ACORN TYPE

Pleasing, decorative appearance and strong spring grip for fastening or covering ends of rods, studs, pins, etc. Closed and open end styles. Sizes from .120" to .312" dia.



ROUND FLAT TYPE

Style PS. Low-cost, space-saving spring steel retainers push on plain rod or axle, providing strong, firm retention of parts, seated or unseated. eliminate notching, grooving, drilling and cotter pins. Sizes for 1/16", 3/32", ⅛", 5/32", ¼", 5/16", 3/8" and ½" dia. rod.

Style PV. Light duty retainer with flexible spring gripping teeth for easy assembly with fingers. For rod dia. ¼", 5/16", 3/8" and 7/16".

ARCHED RECTANGULAR TYPE

Style PH. Push on unthreaded studs to assure tight, vibration-proof assembly of ornaments, medallions, nameplates and other parts. Grip tight on hard chrome studs. Sizes for 1/16", 5/64", 3/32", ⅛" and 5/32" dia. studs.

Write for Free Samples and Data, stating type, size and application.

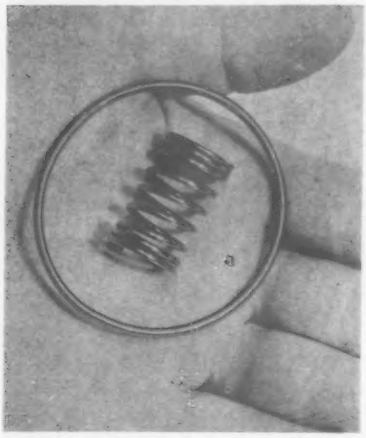
PALNUT®

THE PALNUT COMPANY
DIVISION OF UNITED-CARR FASTENER CORPORATION
79 Glen Road, Mountainside, N. J.
Canada: P. L. Robertson Mfg. Co., Ltd., Milton, Ont.

LOCK NUTS and FASTENERS

Use postpaid card. Circle No. 247

MUSIC WIRE WITH HIGH CORROSION RESISTANCE



Heavy-galvanized music wire has ten to 15 times more corrosion resistance than standard tinned music wire. The zinc coating is three to seven per cent by weight.

The new wire eliminates the need of post plating and the accompanying risks of acid embrittlement and tangling. Wire coiled into close-pitched springs is uniformly protected all around its circumference. Coil ends are protected because cutoff carries zinc over the ends.

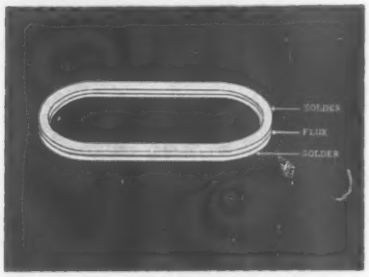
Standard salt spray tests confirm 72-hours resistance for wire from 0.040 to 0.060-in. diameter.

The heavy-galvanized music spring wire is made to standard music wire specifications and is priced the same as tinned finish. Sizes range from 0.012-in. diameter to 0.060-in. diameter. Samples are available.

Dept. RDT, National-Standard Co., Niles, Mich.

Use postpaid card. Circle No. 39

FLUXING ELIMINATED WITH FLUX-FILLED WASHER



Rosin flux-filled, solder washer which eliminates the need for separate fluxing has been introduced. In contrast with the "point" contact achieved with solder rings, these flux-filled washers provide intimate surface-to-surface contact with the area being soldered.

Because of their solder-flux-solder construction, these preforms provide instantaneous fluxing around the entire periphery of the washer, overcoming the problem of localized flux action encountered when rings are used.

Alloyed in all standard combinations of tin, lead, cadmium, antimony, and silver, they are packaged in bulk, in individual containers or on mandrels, depending on the size and fragility of parts.

Alpha Metals, Inc., 56 Water St., Jersey City 4, N.J.

Use postpaid card. Circle No. 40

UNIVERSAL CONNECTOR USES REMOVABLE PINS, SOCKETS

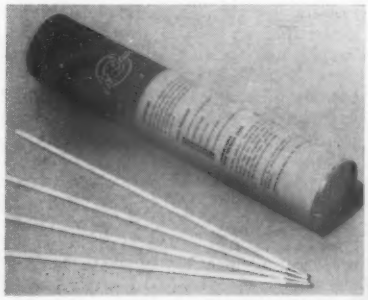
Universal electronic and electric connectors designed for solderless installation such as MS type connectors, employ removable pins and sockets. Various standard configurations of basic connectors, pins and sockets are available to accommodate wire gauges No. 8 through 22 and also coax 131 cables.

The connectors have identical, interchangeable plastic connector body halves for perfect alignment and mating, plus positive electrical connections through all pins and sockets. Tools for inserting and removing pins and sockets are available. A precision crimping tool is also available for attaching pins and sockets to wire. A positive, solderless low resistance electrical bond is assured with this tool.

Hughes, Industrial Systems Div., PO Box 90904 Airport Station, Los Angeles 45, California.

Use postpaid card. Circle No. 41

ALUMINUM ELECTRODE GIVES SMOOTH FLUX COATING



For D.C. reverse polarity welding of aluminum sheet, plate and castings, an all-position aluminum electrode with a patented extruded flux coating develops tensile strength up to 28,000 psi. The aluminum alloy 4043 core wire is combined with a smooth extruded flux coating, reportedly giving quiet welding and dense, spatter-free deposits at low amperages. Slag removal and deposition control are said to be superior to standard dip-coated electrodes.

The electrode is recommended for aluminum railings, tanks, pipe, truck and automobile construction and repairs, for build-up of missing sections, cladding and reinforcing.

All-State Welding Alloys Co. Inc., 249 Ferris Ave., White Plains, N.Y.

Use postpaid card. Circle No. 42

POWRARM IN . . .
PRODUCTION GOES
UP! UP! UP!

FRIDEN CALCULATING MACHINE CO. INCREASES WORKER EFFICIENCY WITH PowRarm! By using Wilton PowRarm Work Positioners as the basic unit of adjusting assembly boards, **Friden increased production through a savings of operator time, motion, and assembly space.** PowRarm allows 360 degrees rotation of the new boards, and workers can incline them at various angles. May be mounted in benches, conveyors, or floor stands as illustrated. Many firms use PowRarm for inspection, servicing, soldering, assembly, and any work positioning operation. Ask your Wilton distributor for a demonstration.

WRITE FOR FREE 52-PAGE CATALOG!

Order Now From Your Stocking Industrial Distributor

WILTON
Wilton Tool Mfg. Co., Inc.
Schiller Park, Ill.
Sold by leading distributors the world over!
AFE-120

Use postpaid card. Circle No. 248

For Additional Copy of this Plan Use Postpaid Card. Circle No. 310

Popular Hobby-Mechanics HOME WORKSHOP

For Additional Copy of this Plan
Use Postpaid Card. Circle No. 310

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

Hobby-rama with ROCKFORD Screw Products

"ROCKFORD" HOME WORKSHOP PROJECT of the MONTH

PEACE ON EARTH

Clock Tower Entrance...Plant No. 3

"ROCKFORD" Screw Products Co.

DECEMBER 1960

COPYRIGHT 1960 ROCKFORD SCREW PRODUCTS CO., PRINTED U.S.A.
2501 9TH ST. ROCKFORD, ILL.

HOME WORKSHOP PROJECT of the MONTH

Hobby-neering with "ROCKFORD" Screw Products

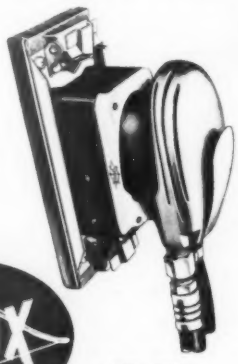
For Additional Copy of this Plan
Use Postpaid Card. Circle No. 310

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

Merry Christmas to American Industries and Manufacturers

ELECTRIC and AIR IMPACT TOOLS

NO. 315
AIR
IMPACT
WRENCH



NO. 501
AIR ORBITAL
SANDER

NO. 315
ELECTRIC
SCREW
DRIVER

Manufactured by:
ALBERTSON & COMPANY, INC.
Sioux City 2, Iowa

TREND MANOR
FURNITURE MFG. CO., IN
7800 Industry Ave.
RIVERA, CALIFORNIA

Manufacturers of Manor Modern E Manor Maple Furniture.

"Lamp Table with Captain's Rail on Top, made of solid Birch Wood, Manor Maple"

BELCHER, INC.
3400 San Fernando Road
LOS ANGELES 65, CALIF.

"Manufacturers of Early American Furniture"

Model 800
BARTON WASHER

Manufactured by:
BARTON CORPORATION
West Bend, Wisconsin

TREND MANOR
FURNITURE MFG. CO., INC.
7800 Industry Ave.
RIVERA, CALIFORNIA

Manufacturers of Manor
Modern E Manor Maple
Furniture.

"Lamp Table with Captain's
Rail on Top, made of solid
Birch Wood, Manor Maple"

Model 800
BARTON WASHER

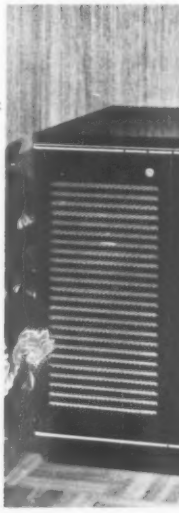
nufactured by:
RTON CORPORATION
est Bend, Wisconsin

OPEN

DWYER PRODUCTS
CORPORATION
Michigan City, Indiana

Manufacturers of DWYER
SNACK BARS.

Manufactured by:
BEL-AIRE PROD



CL

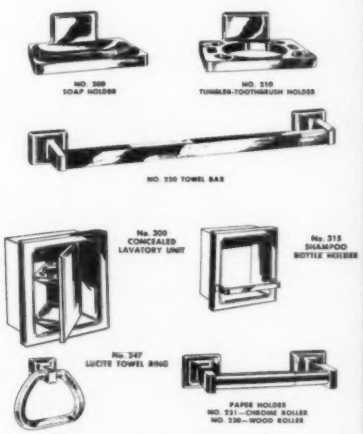
sperous New Year 1961

BEL-AIRE
All Aluminum
CABIN CRAFT
100% Maintenance free.

ctured by:
RE PRODUCTS, INC.

25970 W. Eight Mile Road
SOUTHFIELD, MICHIGAN

CLOSED



Manufactured by:
SEA-CHROME, INC.
1032 Gerhart Ave.
LOS ANGELES 22, CALIF.

Season's Greetings

To our Customers and Associates may we acknowledge with humility and gratitude your wonderful patronage and cooperation during this past year.

May our Faith in the Future be manifested in a common effort toward Peace on Earth and Goodwill to All Men.

Merry Christmas and Happy New Year

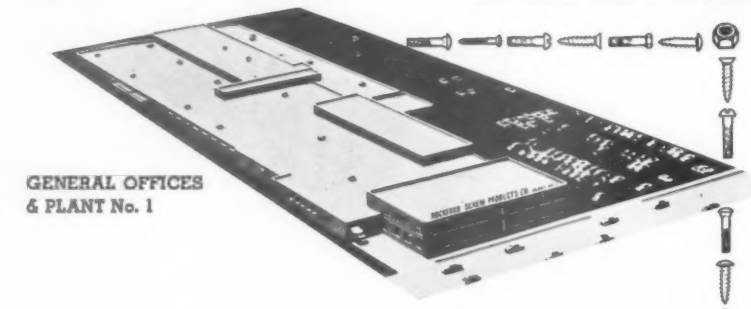
Rockford Screw Products Co.

Swan Hillman

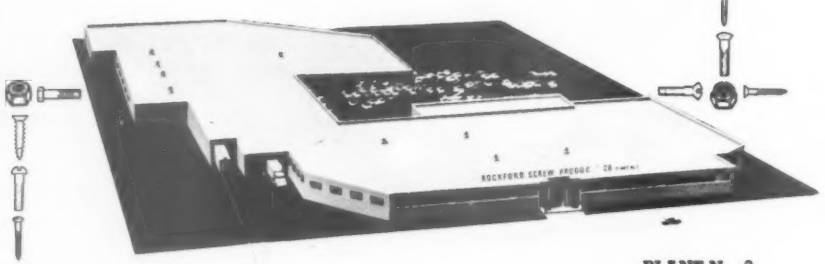
PRESIDENT AND GENERAL MANAGER

TELEPHONE
WOodland
4-9441
TELETYPE
R.K. 7603

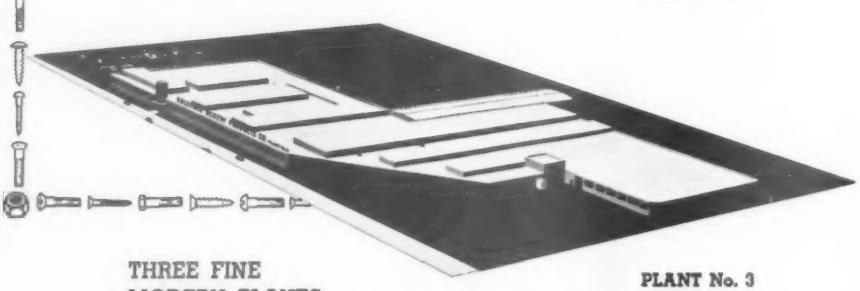
"ROCKFORD"®
Screw Products Co.
2501 NINTH STREET - ROCKFORD, ILL.



GENERAL OFFICES
& PLANT No. 1



PLANT No. 2



PLANT No. 3

THREE FINE
MODERN PLANTS
PRODUCING "ROCKFORD" QUALITY CONTROLLED
THREADED FASTENERS FOR AMERICAN INDUSTRIES.

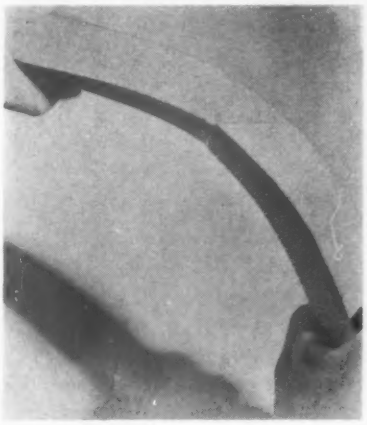
For Additional Copy of this Plan
Use Postpaid Card. Circle No. 310

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

"ROCKFORD"®
HOME WORKSHOP
PROJECT of the

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois
PROJECT of the

ADHESIVE RESISTS VINYL MARINE COATINGS SOLVENT



A flexible, soft-seam adhesive, specially formulated to withstand the solvent attack of the vinyl marine coatings, is used for bonding closed-cell vinyl foam to itself and to fabric, as well as to phenolic and other plastics, to metal, wood, composition board and other materials.

R379-20 may be brushed, roll-coated, or sprayed with conventional equipment to provide bonds which offer resistance to salt water, high humidity conditions; fatigue and vibration; hot oil, gasoline, aromatic fuels and organic solvents; and prolonged exposure to temperatures up to 250° F.

Rubber and Asbestos Corp., 225 Belleville Ave., Bloomfield, N.J.

Use postpaid card. Circle No. 43

NEW METHOD TURNS OUT 4000 CIRCUITRY BOARDS AN HOUR

An automated process for manufacturing printed circuit boards is expected to lower manufacturing costs.

The process is equally adaptable to copper, silver or gold circuit inlays. The method is also adaptable to either high or low quantity manufacturing runs.

Testing of each state of the process indicates that one operator with one machine can manufacture reliable printed circuit boards in quantities up to 4000 per hour, and that one operator can also oversee several automated installations employing the new process.

Schmit Engineering Co., 4062 Fabian Way, Palo Alto, Calif.

Use postpaid card. Circle No. 44

NOTICE

All references to pitch diameters in LOCK THREAD CORPORATION's ad on page 107 of the November issue are for internal threads only.

NOWHERE IN THE WORLD WILL YOU FIND SUCH A VARIETY OF FASTENERS UNDER ONE ROOF

EYELETS, RIVETS, GROMMETS, WASHERS, HOLE PLUGS
SNAP FASTENERS, FERRULES, TERMINALS, STAMPINGS

and many similar fasteners are made in enormous variety and quantity. Made from most any metal and in all finishes. We also make a complete line of machines for attaching eyelets, rivets, etc.

Send for our general catalog which illustrates over 1000 metal articles.

84 FRANKLIN AVENUE EDWIN B. 84 FRANKLIN AVENUE
STIMPSON
BROOKLYN 5, N.Y.,U.S.A. COMPANY. BROOKLYN 5, N.Y.,U.S.A.

84 FRANKLIN AVENUE, BROOKLYN, N. Y.

Use postpaid card. Circle No. 249

"When you put in the Payroll Savings Plan... How did it affect company stock purchases by your employees?"

"Not a bit, Al! You see, quite a number of our people had never made any investment of any kind through regular deductions. When we put in the Payroll Savings Plan for U.S. Savings Bonds we gave many of them a brand new idea. Automatic saving!

"Our State Savings Bonds Director did a grand job of cooperating with us. He helped us organize a company-wide campaign that reached every man and woman on our payroll. It was explained to each employee—*personally*—that with just one signature on a card he could arrange to buy the new 3¾% Savings Bonds, *regularly*. We got a splendid response, and we found that our Company stock purchases increased, too!"

Leading American companies in every one of our 50 states find that substantial employee participation in the Payroll Savings Plan is a sound builder of esprit de corps. People like to feel that they *belong*—to their company group and to the group of millions of patriotic Americans who are contributing to our Nation's Peace Power. Contact your State Savings Bonds Director for prompt, understanding help in spreading Payroll Savings information, person-to-person.

NOW! U. S. SAVINGS BONDS EARN 3¾%

HITCHCOCK PUBLISHING COMPANY

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 74.

WELDING FLAME CHARTS

Two wall charts show the distinctive traits of the Oxy-LP gas flame in comparison with the Oxy-Acetylene flame. Each chart has nine reproductions in full color, with four illustrations referring to welding and brazing flames and five to the cutting flame. The charts are 11" by 17" size, suitable for training and education; and fold to 8½" by 11" to fit standard size catalogs. Smith Welding Equipment Corp., 2633 S.E. Fourth St., Minneapolis 14, Minn.

Use postpaid card. Circle No. 51

SPECIFYING COLD HEADING

How parts, once made by other methods, are now manufactured by cold heading to cut fabricating costs is told through 12 case histories. Eight-page Booklet 10a includes a formula to help determine whether or not a part can be upset by cold heading. A complete line of standard fasteners is pictured, described and specified. Elco Tool and Screw Corp., 1121 Samuelson Rd., Rockford, Ill.

Use postpaid card. Circle No. 52

THREAD ROLLING METHODS

How operation costs in all types of rolling operations were reduced in 15 cases is described in 20-page Bulletin LHY-10. Applicable continuous rolling, in-feed or thrufeed operation, methods and specifications for each case are pictured. Landis Machine Co., Waynesboro, Pennsylvania.

Use postpaid card. Circle No. 53

AUTOMATIC BRAZING UNITS

Illustrated 16-page Bulletin No. S-1058 describes machines for heat treating, selective hardening, brazing and soldering, annealing and other processes for heating metals. Cost-cutting features designed into machines are outlined. Typical applications illustrated include brazing and soldering of aluminum utensils, automotive and aircraft alloy parts. Components for controlled combustion systems are diagrammed. Selas Corp. of America, Dresher, Pa.

Use postpaid card. Circle No. 54

CLAMP DESIGN MANUAL

Each part offered is indexed numerically and visually in a 76-page illustrated manual for designers, listing material, specifications and application techniques for mounting tubing, wiring and similar hardware. Also included are keyed drawings and descriptions of clamps, brackets, shims and line supports. Standard cushion information showing code, properties, specifications, strength and widths are listed in a ready reference chart. Bulletin 212 G, TA Mfg. Co., 4607 Alger St., Los Angeles, Calif.

Use postpaid card. Circle No. 55

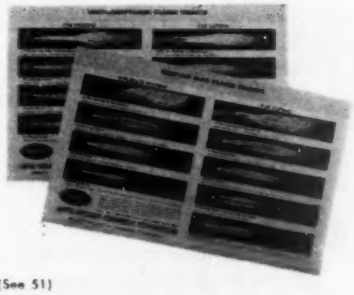
AIRCRAFT RIVETS

When a company changes its name, it does not change the type or quality of its products. This is the theme of a brochure, which gives a photographic tour of the plant. Company executives and a description of manufactured products are also included. Hi-Shear Corp., 2600 W. 247th St., Torrance, Calif.

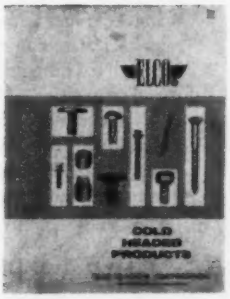
Use postpaid card. Circle No. 56

PRODUCT PURCHASING LIST

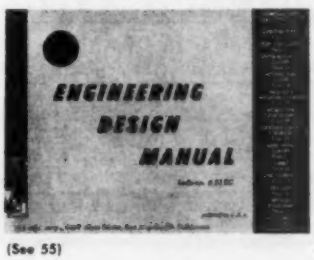
Often a company becomes identified with only one of its products. To correct this situation, a pocket-sized booklet catalogs the 15 separate divisions and eight subsidiary companies manufacturing hundreds of different products such as fasteners, chain, wire rope, cable assemblies, wire, electronic instruments, welding wire, etc. Sales office addresses included. American



(See 51)



(See 52)



(See 55)

ALLMETAL

Immediate Shipment

FROM ENDLESS STOCKS of

STAINLESS STEEL FASTENERS

AN—MS—COMMERCIAL

Your order, large or small, filled "fast" from the world's largest stock of stainless steel fasteners. AN, MS, Commercial specifications in stock. Rigid quality control, mass production economies. Special stainless steel fasteners also manufactured to your exact requirements on extremely short notice. Just send blueprint or specs for quotation. Full range of raw material, on hand, assures prompt service.

WRITE • WIRE • PHONE

FOR QUOTATION OR SHIPMENT ASK FOR CATALOG

ALLMETAL®

Screw Products Company, Inc.

MANUFACTURERS OF STAINLESS FASTENERS SINCE 1929

821 Stewart Avenue, Garden City, L.I., N.Y.
Phone: Pioneer 1-1200 TWX GCY 603

Midwest Division
6424 W. Belmont Avenue, Chicago 34, Illinois
Phone: AVenue 2-3232 TWX CG 3185

West Coast Division—Office and Warehouse
5822 West Washington Blvd., Culver City, Calif.
Phone: WEbster 3-9595 TWX LA 1472

Use postpaid card. Circle No. 251

Chain and Cable Co., 929 Connecticut Ave., Bridgeport 2, Conn.

Use postpaid card. Circle No. 57

MULTI-CONDUCTOR WIRING

Uses of flat multi-conductor wiring for electric and electronic assemblies is the subject of a six-page brochure. Design information and specifications are also included. Methode Manufacturing Corp., 7447 W. Wilson Ave., Chicago 31, Ill.

Use postpaid card. Circle No. 58

MINIATURE INSERTING TOOL

How a miniature power inserting tool, designed to install a range of small sizes of Heli-Coil stainless steel wire screw thread and screw lock inserts can reduce production time and costs, is described in a four-page Bulletin 770A. Photographs, installation and maintenance instructions, prices and an exploded view highlight details of design and use. Heli-Coli Corp., Danbury, Conn.

Use postpaid card. Circle No. 59

FUSION WELDING REPORT

"A Pictorial Report of Sciaky Developments in Highly Precise, Fully Automatic Fusion Welding Equipment," is a 28-page booklet describing actual applications. Technical data accompanies photos of equipment used in programs such as the B-70 and Hawk missile. Dept. FW-1, Sciaky Bros., Inc., 4915 W. 67th St., Chicago 38, Ill.

Use postpaid card. Circle No. 60

BAND CLAMPS

Dismantling and re-assembly of duct systems is made easier with band clamps described in technical data Bulletin OEM 760. Designed for ducting applications on sleeves, air filters and hoses, engineering details of three types of band clamps, including stainless steel flat bands, is also given. Wittek Mfg. Co., 4305 W. 24th Place, Chicago 23, Ill.

Use postpaid card. Circle No. 61

COLD HEADED FASTENERS

A brochure covers standard fasteners and special developments within the cold headed and screw machine products industry. Included are stover nuts, place bolts, nylock fasteners, flange bolts, and special fasteners; hardened and ground transmission valves, gear blanks, valve lifters, and other precision parts. Federal Screw Works, 3401 Martin, Detroit, Mich.

Use postpaid card. Circle No. 62

ADHESIVES SELECTOR CHART

A selector chart 100-A shows the outstanding properties of key Hysol adhesives and hardeners, their tensile shear strengths at different temperatures and in several fuels. Also, the operating temperature range, izod impact, coefficient of thermal expansion and other criteria are indicated. This guide fits into regular three-ring binders or, when unfolded, makes an easy reference wall chart. Hysol Corp., Olean, New York.

Use postpaid card. Circle No. 63

WELD FASTENERS

How to eliminate gaskets and sealing problems through the use of projection welding and weld screws is the subject of Bulletin 606. Listing of weld screws in varying length, head diameter and thread size is included. Ohio Nut and Bolt Co., 33 First Ave., Berea, Ohio.

Use postpaid card. Circle No. 64

SET SCREWS

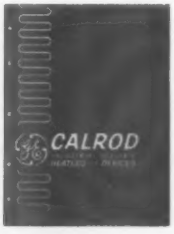
Variations in dimensions and distortion common with multiple dies in forming socket screws is eliminated with an electronic pre-heat process of the metal to be formed. Resultant ductility, permitting complete forming with only one die, is the subject of a four-page flyer. Holo-Krome Corp., Brook St., Hartford 10, Conn.

Use postpaid card. Circle No. 65

HIGH SPEED ASSEMBLY

A conveyor indexing chassis is described in a four-page brochure as ideal for high speed automatic assembly, testing and inspection, indexing and packaging. Dimensional drawings are included and special features of the basic unit are letter-keyed on a photograph. Sylvania Lighting Products, Equipment Development Plant, 121 Loring Ave., Salem, Mass.

Use postpaid card. Circle No. 66



GUIDE TO HEATING

Whether heating liquids, solids or air, revised 48-page Catalog 1005K will be valuable in determining the correct ratings, temperatures and equipment needed. Tubular, finned tubular, cartridge, strip, insertion and vane heaters; forced and natural convection air heaters and other models are specified and pictured. Sections on heater control and wiring diagrams are included. General Electric Co., Schenectady 5, N.Y.

Use postpaid card. Circle No. 67

CONTRACT RESEARCH

In step-by-step manner, the relationship between an industry client and Battelle Memorial Institute is presented

in a six-page gatefolded brochure. How the R&D contract is first proposed and then carried out is described in text and illustrations. Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

Use postpaid card. Circle No. 68

COILED BAND SPRING

"The Neg'ator Sketchbook", No. 9, presents design information on a coiled band spring which extends many times its original size without the increasing force common to conventional springs. Properties and use as an electrical connector clip, safety clip and retaining band are given in photos and text in the two-page file sheet. Hunter Spring Co., 29 Spring Ave., Lansdale, Pa

Use postpaid card. Circle No. 69

HYDRAULIC CYLINDER

A high pressure square head cylinder is introduced in 16-page Bulletin SH-6-60. General and technical engineering information, model and mounting dimensions and specifications for this new interchangeable high pressure cylinder are offered. Features are number-coded in a full page cutaway drawing. Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Mich.

Use postpaid card. Circle No. 70

SOCKET SCREWS

Literature on socket head cap screws includes a 24-page price list and brochures with specifications and illustrations of the fastener line. The Led-Lok cap screw with pre-assembled washer is designed especially for sealing and the Saf-Lok is for severe vibration applications. The 1960 Series is available. Safety Socket Screw Co., 6501 N. Avondale Ave., Chicago 31, Ill.

Use postpaid card. Circle No. 71

SOLDERING FUNDAMENTALS

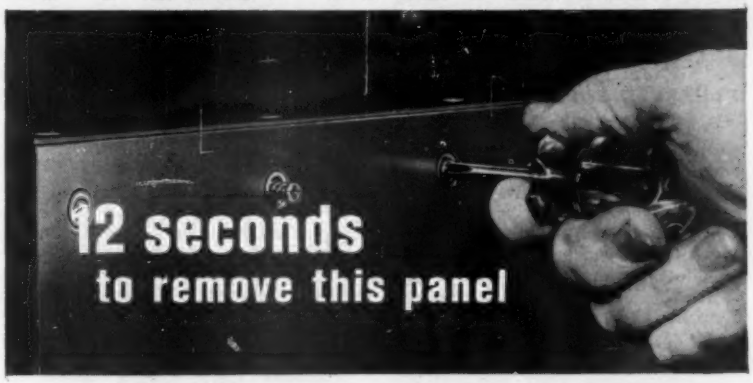
The 1961 edition of the Kester manual, "Solder—Its Fundamentals and Usage" has been expanded by 30 pages to include the latest developments in soldering materials and techniques. Kester Solder Company, 4201 W. Wrightwood Ave., Chicago 30, Ill.

Use postpaid card. Circle No. 72

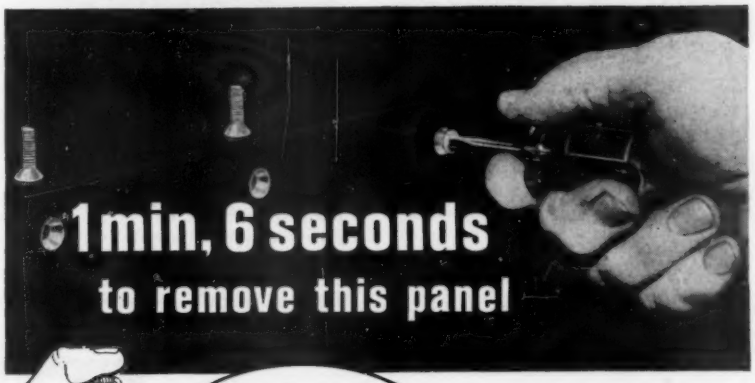
LIGHTWEIGHT FASTENER

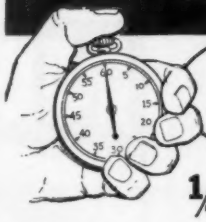
Lightweight 900°F aircraft fastener with a 220,000 psi tensile strength and endurance limit of 80,000 psi at 8 megacycles is described in four-page Bulletin LWB 922. Bolt dimensional information, tabulated mechanical properties of the bolt-nut joint and a plot of

¼-TURN FASTENERS



VERSUS SCREWS





Designed To SAVE YOU Time

CAMLOC ¼-TURN FASTENERS

The odds are in your favor by 5½-to-1 when you design-in Camloc ¼-turn fasteners. By actual test, you save that much time—compared to screws—in removal and replacement of these panels. What's more, there are no loose parts—Camloc fasteners are "captive" in the mating panels. By all odds, Camloc ¼-turn fasteners cost you less to use, save you time, save you effort in fabrication and service. Millions of fasteners in use today are proof of their outstanding, money-saving qualities. Write today for Catalog.

SOME TYPICAL APPLICATIONS

Aircraft Panels • Electronic Sub-assemblies • Railroad Cars Heavy Machinery • Lighting Fixtures • Missiles • Automotive Equipment • Television Studio Equipment • Transit Cases • Business Machines • Consoles • Collapsible Units

CAMLOC

"Specialists in Fasteners for Industry"

CAMLOC FASTENER CORPORATION

14 SPRING VALLEY RD., PARAMUS, N. J.
LOS ANGELES, CALIF. • FT. WORTH, TEXAS

Use postpaid card. Circle No. 252

tension-tension fatigue performance at both room and 900° temperature is included. Standard Pressed Steel Co., Box 1121, Jenkintown, Pa.

Use postpaid card. Circle No. 73

FLUXLESS SOLDERING

How metals such as aluminum, magnesium, and their alloys can be soldered without flux is described in Bulletin V14A. Using ultrasonics, fluxless soldering eliminates special surface pre-treatment and post-cleaning to remove flux. Electrical and mechanical specifications are also included. Gulton Industries, Inc., 212 Durham Ave., Metuchen, N.J.

Use postpaid card. Circle No. 74

SPECIAL HAND TOOLS

Highly specialized hand tools, custom-made to cope with unusual assembly and service problems, are featured in illustrated Bulletin 660. While most were specially designed for the application, some represent modifications of standard tools. The bulletin suggests ways to minimize the cost of designing and producing special purpose tools. Xcelite, Inc., Orchard Park, New York.

Use postpaid card. Circle No. 75

CONVEYOR SYSTEMS

Coordinated material handling planned for increased assembly line productivity, space saving and general cost reduction is the topic of 43-page hand book, GC-1. Accumulation, transfer and control, as well as movement of material; conveyor system accessories, hand trucks and wheels are also shown. Rapids Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids, Mich.

Use postpaid card. Circle No. 76

LEVER AND TEE HANDLES

Locking handles having five and six disc tumblers providing a wide variety of key changes are described in a four-page brochure. Engineering specifications for locking lever tee handles used in cabinets, panel boards, electronic equipment, etc., are offered. American Hardware Corp., Corbin Cabinet Lock Division, 10 Franklin Sq., New Britain, Connecticut.

Use postpaid card. Circle No. 77

AUTOMATIC ASSEMBLY UNIT

Economics of converting to automatic assembly are treated in a four-page folder. Standard transfer machine and cam actuated components can be fitted to special tooling to meet specific requirements at costs within reach of most companies. The standard movements and specifications of the basic machine are dimensionally drawn. Gilman Engineering and Mfg. Co., 305 W. Eastern Ave., Janesville, Wis.

Use postpaid card. Circle No. 78

BUSHING DESIGN DATA

Formulas for computing effective length, number of bushing segments, and grip length of complete bushing assembly are included in a four-page bulletin. Design information is charted for adjustable wall thickness bushings for bolts, pins or shafts from 3/16" to 1". Adjustable Bushing Co., 12036 Vose St., North Hollywood, Calif.

Use postpaid card. Circle No. 79

FLEXIBLE WORK STATIONS

Typical assembly stations built on modular principle of flexibility (with standard parts) are pictured and described in 12-page Bulletin 1257. How various combinations are put together from three basic frame members is told. Accessories and special configurations are also specified. Products For Industry, Inc., 1530 Summer St., Stamford, Conn.

Use postpaid card. Circle No. 80

● Chances are that with present high wages, your product assembly time and costs are high.

Chances are also that you can make big savings through the use of automated rivet fastenings.

National Automatic Machines are available *tooled specifically to meet your job requirements*. National low-cost automated in-place fastening operation speeds work and reduces employees required by as much as 70 per cent in many cases.

To find out, send sample preferably—or blue print to get our practical recommendations. They can be worth big savings to you.

NATIONAL RIVET & MFG. COMPANY
211 MAIN STREET • WAUPUN, WISCONSIN

NATIONAL RIVETS
TUBULAR, SPLIT, SOLID ALL METALS

Use postpaid card. Circle No. 253

NEW! ENGLAND'S *finest*

***Compact* PNEUMATIC SCREWDRIVER *by* DESOUTTER**

$79.00 nonreversing to $125.00 reversing

- 12 MONTH GUARANTEE
- PATENTED PORT-VALVE DESIGN
- REALLY SILENT RUNNING
- PROMPT SERVICE, PARTS

Write for* FREE *catalog!

NEWAGE INDUSTRIES, INC.
222 York Road, Jenkintown 23, Pa.

Use postpaid card. Circle No. 254

SCREW IDENTIFICATION

A circular slide-type device solves problems in identifying heads, washers, and threads when ordering screws, by showing pictures and giving their correct nomenclature. Printed on the back of the 9½" x 9½" Screw Descriptor is a decimal equivalent chart. Active Screw & Mfg. Co., Dept. 463, 4250 N. Pulaski Rd., Chicago 41, Ill

Use postpaid card. Circle No. 81

ELECTRONIC CONNECTORS

Printed circuit connectors with design engineering dimensional drawings and charts are shown in 16-page Catalog 60. Bantam plug and receptacle type BT and MS; molded and filed type cables; rack and panel, and triaxial connectors are also shown. H. H. Buggie Division, Burndy Corp, Toledo, Ohio.

Use postpaid card. Circle No. 82

FLUX FINDER GUIDE

Using the right flux and solder for individual soldering needs is the subject of Bulletin No. 100 R. Metals are charted as to order of solderability and type of solder to be used. Fluxes are listed as to recommended use. Alpha Metals, Inc., 56 Water St., Jersey City 4, New Jersey.

Use postpaid card. Circle No. 83

LOCKNUTS

Spring tempered steel locknuts, including regular hex, integral washer, acorn, wing and adjusting nut types are described in 24-page Catalog 592-A. Details of design and locking principle, advantages, typical applications, specifications, load ratings, materials and finishes are presented. Palnut Co., 79-L Glen Rd., Mountainside, N.J.

Use postpaid card. Circle No. 84

PRESS-ON MATERIALS

A "do-it-yourself" folder includes samples of pressure sensitive materials designed to speedy assembly line operations. The products can be stamped, die cut, embossed and come in paper, foils, laminates, vinyls, polyesters and acetates. Fasson Products, 250 Chester St., Painesville, Ohio.

Use postpaid card. Circle No. 85

ELECTRONIC ASSEMBLY UNITS

A four page mailer describes and illustrates various automatic assembly units for the electronic industry. Some units described are the lead bender, lead former, lead straightener and lead taping machine. Design Tool Co., Federal Manufacturing and Engineering Corp., 1055 Stewart Ave., Garden City, Long Island, N.Y.

Use postpaid card. Circle No. 86

HOLE PUNCHING UNITS

Units for punching holes up to 3" in diameter in metal up to ¼" thick are dimensionally drawn and specified in 16-page Catalog A. Keylined photos also point out features of the units, which include Series A units for notching corner, edge, vee and shaped notches. Punch Products Corp., 370 Babcock St., Buffalo 6, N.Y.

Use postpaid card. Circle No. 87

EYELETS AND BASE PINS

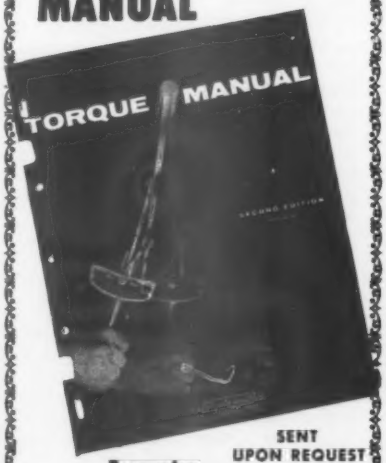
Latest listing of rolled and flat flanged; funnel and telescopic eyelets and seamless base pins are indexed and listed with application data in 16-page booklet BG-1. Also cataloged are irregular shaped eyelets and canvas and fabric eyelets and grommets. American Brass Co., P.O. Box 829, Waterbury 20, Conn

Use postpaid card. Circle No. 88

SILVER BRAZING GUIDE

Properties of various fluxes, and their use in low temperature silver brazing is the subject of a pocket-sized 14-page guide. Included is a chart for flux selection for metals, and a ready

"TORQUE WRENCH" MANUAL



SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

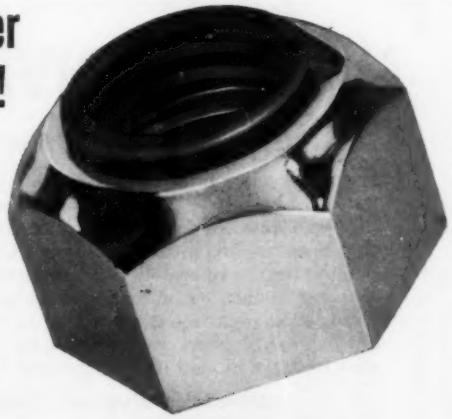
Use postpaid card. Circle No. 255

There Is No Other Locknut Like This!

Security Locknuts Hold!

- They do not require BOLT TENSION. They are self-locking anywhere on the bolt and can be adjusted or re-adjusted at any time.
- They can be removed or replaced at any time without losing their locking effect or damaging the bolt.
- They will not loosen even under extreme vibration.
- The load is carried by the bolt, not the Locking Insert.
- They are installed with an ordinary wrench, saving hours of time over the use of castle nuts, double nuts or peened bolt ends.
- They are supplied in sizes from ¾" to 4".

Send the Coupon for more details.



Security

THE NUT YOU CAN'T SHAKE LOOSE

HOW IT WORKS!

Made of the finest spring steel available, the high-tension spring steel Locking Insert is elliptical in shape and is a permanent part of the Locknut. As the nut is forced on the bolt, the spring steel is forced into the round and grips the bolt with terrific tension. The nut will remain in place.

SECURITY LOCKNUT CORPORATION
North Avenue at 15th Avenue, Melrose Park, Ill.

Here is a drawing of our product. What self-locking fastener would you suggest? ☐

Company Name _____

Address _____

Town _____ State _____

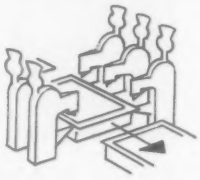
Signed _____ Title _____

Use postpaid card. Circle No. 256

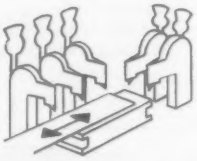
A FEW OF MANY POSSIBLE RIVETING HEAD POSITIONS THAT CAN BE USED

Rotating fixture showing suggested arrangement of riveting heads.

Riveting heads can be positioned for fastening on flat or curved assemblies.



Conveyor Belt permits multiple setting on both sides of an assembly.



Sliding fixture used for riveting 2 sides of an assembly.

AUTOMATE RIVET SETTING

for new low costs

For years assemblies made of metal and non-metal or a combination of both have been fastened most economically with semi-tubular rivets. And now even lower costs are possible with the thin-nose riveting heads designed by Chicago Rivet. These heads, pneumatically operated but electronically controlled, can be grouped in clusters on one or more planes and will set rivets as close as $\frac{13}{16}$" apart. Automation, thru rotating sliding or continuous belt feeding and riveting stations, is possible. Riveting heads may be repositioned and used again on new assemblies.

CUSHIONED RIVETING REDUCES BREAKAGE

A pneumatic riveter upsets the rivet with a squeezing action which minimizes breakage and automatically compensates for slight variation in assembly thicknesses.

The suggestions of Chicago Rivet fastening specialists will prove most helpful. Call them—no obligation.

AIR-POWERED RIVETING CATALOG contains description and specifications of 8 single and multiple riveters—also rivet setters designed for automation.

RIVET CATALOG describes 1388 standard tubular and split rivets and 25 single and multiple motorized automatic rivet setters.

Chicago Rivet & MACHINE CO.

946 So. 25th Ave., Bellwood, Ill. (Chicago Suburb) • Branch Factory: Tyrone, Pa.

Use postpaid card. Circle No. 257

reference chart showing brazing alloys by trade name and nominal compositions, American Platinum & Silver Division, Engelhard Industries, Inc., Newark, N.J.

Use postpaid card. Circle No. 89

ASSEMBLY HAND TOOLS

Hand tools designed for assembly operations are pictured and specified in a 16-page catalog. A work vise locks in any position. Unusual screwdrivers for sub-miniature parts and other specific applications, nutdrivers, soldering aid tools, tweezers, pliers are available from stock. Hunter Tools, 9851 Alburtis, Santa Fe Springs, Calif.

Use postpaid card. Circle No. 90

COLD HEADED WIRE DRAWER

Built in eight sizes for handling all diameters of rod from No. 5 to a maximum 1½", straightness and absence of age hardening is one of the advantages described for a cold headed wire drawing machine. Photographs of installed wire drawers, and technical data is included in 12-page Bulletin 111-B. Ajax Mfg. Co., 1411 Chardon Rd., Cleveland 17, Ohio.

Use postpaid card. Circle No. 91

SOLDERING TOOLS

Nine specific improvements on the No. 776 soldering handle are pictured and described in a two-page cutaway drawing. Eight-page Catalog S-60 also introduces a complete line of soldering tips for temperatures from 650 to 1000°F. Tips for de-soldering and four kits for circuit re-work are presented. Ungar Electric Tools, 4101 Redwood Ave., Los Angeles 66, Calif.

Use postpaid card. Circle No. 92

SOLID FILM LUBRICANT

Air drying solid film lubricant is described in a two-page data sheet. Containing a molybdenum disulfide compound, Surf-Kote is designed to provide a hard durable solid film lubricant on most types of metallic surfaces. Applied by spraying, dipping, or brushing, the lubricant will air dry in 15 to 20 minutes. Hohman Plating & Mfg. Co., 814 Vermont Ave., Dayton, Ohio.

Use postpaid card. Circle No. 93

FASTENERS FOR AIRCRAFT AND MISSILES
Immediate Delivery—AN—N.A.S.—M.S.—6 Digit
CERTIFIED TO GOVERNMENT SPECIFICATIONS
Bolts—Nuts—Rivets—Screws—Studs—Internal and External Wrenching Bolts—Dowel and Lock Pins
Mercury air parts co., inc.
9310 West Jefferson Blvd., Culver City, Calif.
Telephone—UPton 0-5923—Teletype—CVR CT 4138
TOUGH SPECIALS 10 DAY DELIVERY
MANUFACTURERS OF PRECISION HARDWARE

Use postpaid card. Circle No. 258

assembly and fastener engineering

DECEMBER, 1960
(Not valid after February 28, 1961)

Tear out and mail this card!

Please have information sent me on all items I have encircled.

Your Name ..... Title.....

Company .....

Address .....

City ..... Zone..... State.....

Products Manufactured .....Appox. No. Plant Employees.....

ADVERTISEMENTS

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160

What article in this issue interested you most?

What subjects would you like to see published in future issues?

These Reader Service Cards are for your convenience. They will assist you in getting the additional information you require about any editorial item or advertisement. Because of the speed with which thousands of cards are processed each month it is essential that the blanks be filled in accurately and completely. This will save time and speed the information to you.

Please use only one Reader Service card and let one of your colleagues use the other.

assembly and fastener engineering

DECEMBER, 1960
(Not valid after February 28, 1961)

Tear out and mail this card!

Please have information sent me on all items I have encircled.

Your Name ..... Title.....

Company .....

Address .....

City ..... Zone..... State.....

Products Manufactured .....Approx. No. Plant Employees.....

ADVERTISEMENTS

201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160

What article in this issue interested you most?

What subjects would you like to see published in future issues?

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

ASSEMBLY & FASTENER ENGINEERING

A Hitchcock Publication

WHEATON, ILLINOIS

Readers' Service Division

USE THESE HANDY POSTAGE PAID CARDS FOR HELPFUL INFORMATION AND LITERATURE

FIRST CLASS
PERMIT NO. 272
WHEATON, ILLINOIS

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

ASSEMBLY & FASTENER ENGINEERING

A Hitchcock Publication

WHEATON, ILLINOIS

Readers' Service Division

AUTOMATIC ASSEMBLY

Cost reduction in assembly with rivets, made possible with an automatic hopper feed squeeze riveter, is one of the units shown in a descriptive booklet of automatic assembly units. Three part rivet assemblies; automatically fed tapered parts and hopper feed units are also shown. Aidlin Automation, Inc., 1613 E. New York Ave., Brooklyn 12, N.Y.

Use postpaid card. Circle No. 94

LIGHT DUTY INDEX TABLE

Automatic machines for assembling, inspecting and forming small parts, as in the electrical-electronic, or instrumentation industries, can be achieved with a new light-duty indexing table. Described in folder CO-1, selection tables and engineering data are also included. Ferguson Machine Corp., 7818 Maplewood Industrial Ct., St. Louis 17, Missouri.

Use postpaid card. Circle No. 95

WELDING TRANSFORMERS

How epoxy impregnation and encapsulation of welding transformers provides up to 33% greater kva capacity is told in eight-page Bulletin T60-1. Long weld cycles, better overload protection and longer operating life are also reported for a line of Epoxy-Pak transformers. Cross-sectional drawings, photos and specifications are included. Kirkhof Mfg. Corp., 2450 Buchanan Ave., S.W., Grand Rapids 7, Mich.

Use postpaid card. Circle No. 96

SANDWICH PANEL SPACER

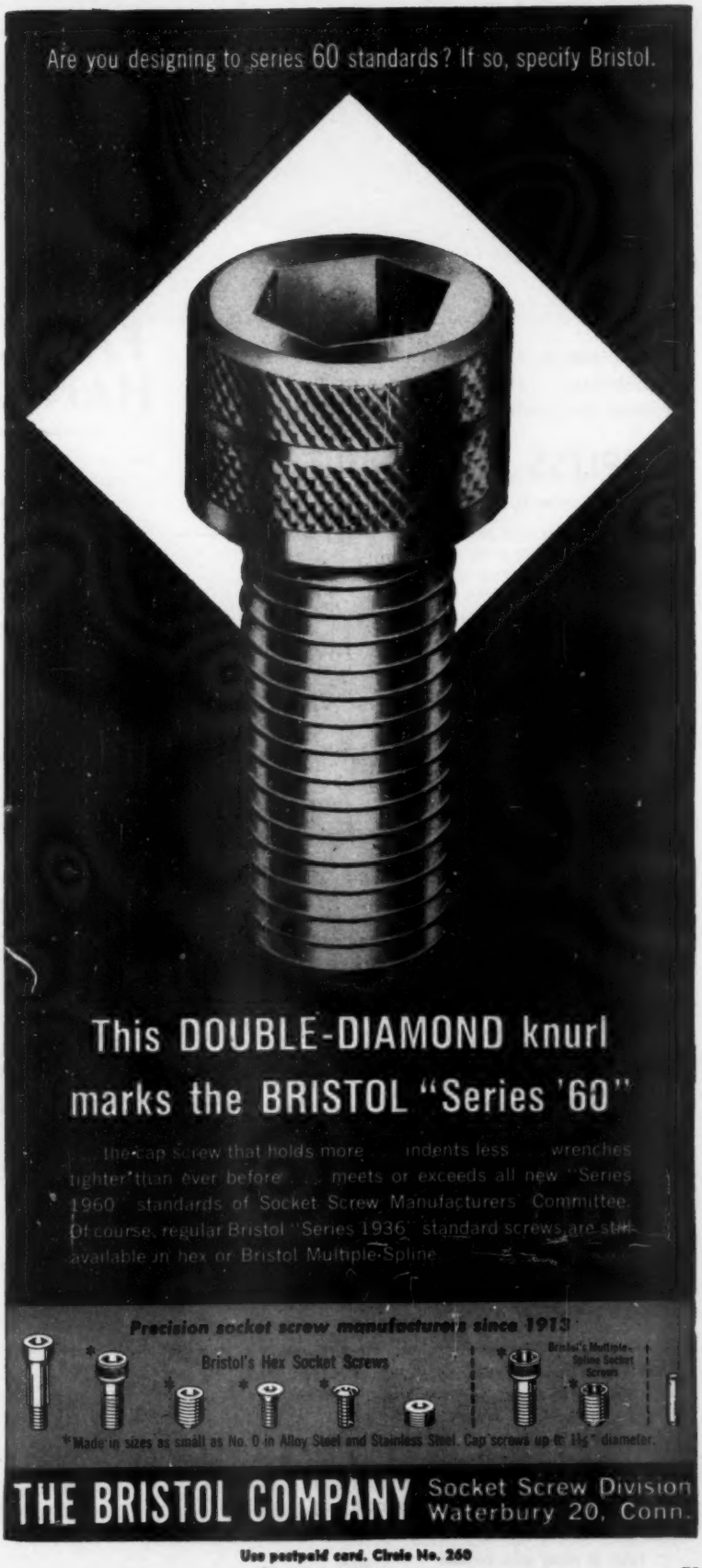
Four-page Form 8-659 describes a universal-type spiral spacer for joining crushable panels to other parts or panels. Potential uses for the new spacer are suggested and typical applications are illustrated with cross-sectional drawings. Installation procedures are shown, along with hole preparation data. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 9, Mich.

Use postpaid card. Circle No. 97

WASHABLE TRACING FILM

How the printability of original tracings can be restored by washing with soap and water is described in a four-page bulletin. Included with the bulletin is a sample of Herculene drafting film plus a Duralar pencil which puts down a waterproof plastic line. Keuffel & Esser Co., 3rd & Adams Sts., Hoboken, N.J.

Use postpaid card. Circle No. 98


Are you designing to series 60 standards? If so, specify Bristol.
This DOUBLE-DIAMOND knurl
marks the BRISTOL "Series '60"
the cap screw that holds more indents less wrenches tighter than ever before . . . meets or exceeds all new "Series 1960" standards of Socket Screw Manufacturers Committee. Of course, regular Bristol "Series 1936" standard screws are still available in hex or Bristol Multiple-Spline.
Precision socket screw manufacturers since 1913
Bristol's Hex Socket Screws
Bristol's Multiple-Spline Socket Screws
*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diameter.
THE BRISTOL COMPANY
Socket Screw Division
Waterbury 20, Conn.

Use postpaid card. Circle No. 260

BOOKS YOU CAN USE...

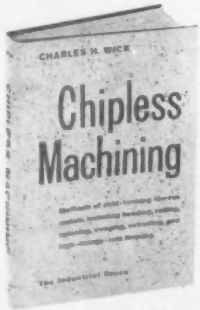
Put the latest know-how and techniques at your fingertips

A new how-to volume on chipless machining . . . shaping metal parts without the production of chips . . .

CHIPLESS MACHINING

By Charles H. Wick

This basic, technical guide describes and illustrates in detail the newer methods of cold forming, gives data on economies resulting from savings in time and materials and evaluates advantages and limitations of various processes and their applications. Covers cold-heading, thread rolling, spline rolling, power spinning, rotary swaging, radial forging, cold forming, cold extrusion and explosive forming. Of special value to top management, design engineers, process planners, tool engineers and production men because emphasis is on practice—not theory.

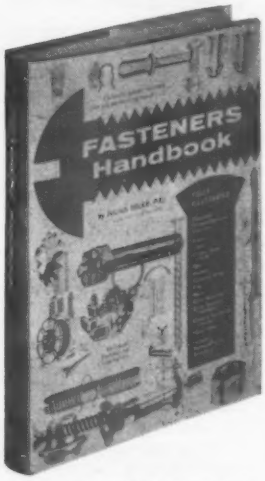


502 pages, 326 illustrations
$10.00

FASTENERS HANDBOOK

By Julius Soled, P.E.

Here is a book which provides ready, up-to-date answers to fastening problems in all fields. Its pertinent data, hundreds of illustrations, and full page descriptions supply you with detailed information on currently available fasteners and sources of supply. You can use this book to actually **select** the fastener you want because this comprehensive book includes standard and proprietary fasteners from all manufacturers. It can be used by design engineers, patent attorneys, sales personnel, fastener distributors and jobbers—in fact, anyone who needs solid information on fasteners available for mechanical assembly.



448 pages, over 900 illustrations
$12.50

COVERS EVERYTHING in fasteners . . . rivets, inserts, screws, bolts, studs, nuts, washers, retaining rings, pins, nails, metal stitching, quick release fasteners, masonry anchoring devices, hose clamps and many other types . . . together with directory of manufacturers.

The how and why of developing equipment for special operations . . .

AUTOMATING THE MANUFACTURING PROCESS

By George F. Hawley
Vice President of Development & Engineering
Automation Engineering Laboratories

This valuable book discusses in practical terms the problems involved in developing automatic machinery for specific operations such as assembly of components, packaging of individual products and a host of other applications. Valuable to both management and production personnel as well as designers and development engineers, it will be of direct, practical help to any company contemplating or planning automation of any manufacturing operation.

1959—176 pages—$4.95

THE NEW PRODUCT

By Delmar W. Karger
Professor and Head of Department of Management Engineering, Rensselaer-Polytechnic Institute, Troy, New York

This is a guide for successful product development. It provides tangible help to both experienced manufacturers and those who have done little or no product development. Basic concepts of top management planning and organization for product planning and new product development are covered. The book contains chapters on: basic concepts, organizing for product development, finding new product ideas, costing and pricing the new product, patents, research and engineering, sales, advertising and management considerations of new product development.

6" x 9", 244 pages, $5

This is an important book for today's buyers' market, where success depends on how well a company competes, providing an answer for the farsighted manufacturer who wants to know how he too can develop new, successful products; new, profitable markets.

Book Division
Hitchcock Publishing Company
Wheaton, Illinois

Please send me prepaid the books indicated below:

_____ *copies of "Automating the Manufacturing Process" @ $4.95.*
_____ *copies of "Fasteners Handbook" @ $12.50.*
_____ *copies of "Chipless Machining" @ $10.00.*
_____ *copies of "The New Product" @ $5.00.*

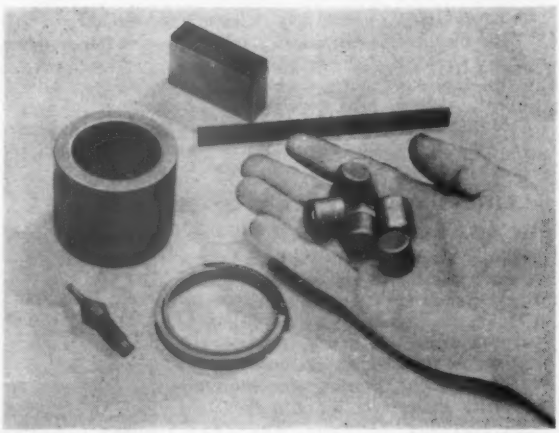
☐ **Check or money order enclosed**
☐ **Company purchase order enclosed**
☐ **Please bill my company**

Name _____
Company _____
Address _____
City _____ Zone ____ State ____

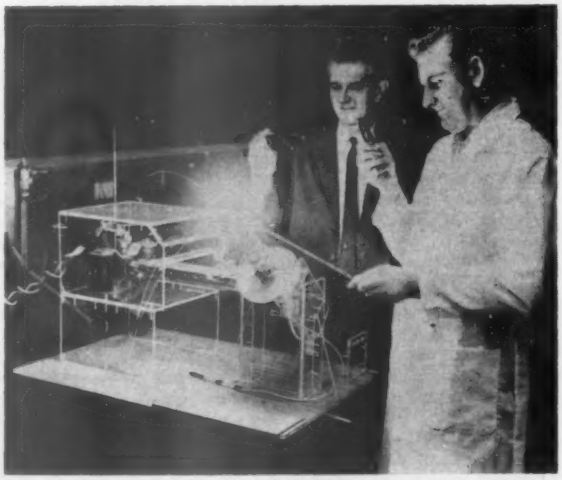
ORDER NOW!

Use this handy coupon to put these books to work for you at once. There is no substitute for accurate information and practical, "how-to" suggestions. All books shipped promptly . . . and prepaid.

INDUSTRY MAKES NEWS



Variety of shapes and sizes into which titanium diboride can be fabricated. In the hand are milling balls, and on the left a rugged crucible. Above the bar stock is a piece of TiB_2 to which steel has been joined. Illustrating the machinability of titanium diboride are a small metal atomizing nozzle and a seal ring prototype.



Builder of the plasma torch, John Martin (r) demonstrating steel melting properties, while Frank Randall, president of company, looks on.

SEPTEMBER FASTENER SHIPMENTS UP

September fastener shipments were 97% of the 1956-58 average, on the seasonally adjusted basis. Showing an 8 point increase over August, the shipments may indicate the industry's traditional October pick-up started in September. Shipments for September were 5% higher than September, 1959.

HIGH-TEMP TITANIUM DIBORIDE COMPOUND

National Carbon's titanium diboride maintains a flexural strength of 35,000 psi over a wide temperature range of 25° through 2000°C. It has a high modulus of elasticity similar to ceramic materials. Its weight is approximately half that of stainless steel, and only 12% greater than alumina, making its use possible for light-weight ball and roller bearings for jet and rocket engines operated at elevated temperatures.

The hardness of the diboride is in the range of boron carbide. Although its hardness makes fabricated titanium diboride virtually unmachinable except with diamond tools, intricate shapes can be machined with conventional tools during the processing stages.

Titanium diboride has excellent resistance to oxidation at 1000° C, and low oxidation even at 1400° C. It is inert to molten aluminum, molten zinc, and molten slags, but is not resistant to molten ferrous metals.

PLASMA TORCH USES RF FIELD

Temperatures in excess of 3000° C have been achieved with a plasma torch, by using the energy of a high radio frequency electromagnetic field to dissociate and ionize gas molecules into their component atoms.

When the atoms recombine into their original state, the absorbed energy is liberated in the form of heat.

The electromagnetic field is created by a coil or coaxial cable. The coil unit uses a standard $20 transmitting triode operating at 27 Mc, with an output of 250 watts. The coaxial cable unit uses a

continued

BEHR

FASTENER AND WIRE FORMING EQUIPMENT

complete plant layouts or departments

BEHR MACHINERY & EQUIPMENT CORP.
1210 Seminary St.
Rockford, Ill.
U.S.A.
Phone WOodland 2-7721
Cable BEHR

COLD HEADERS
THREADING MACHINES
WIRE DRAWING MACHINES
WIRE STRAIGHTENING UNITS
SPRING MAKING MACHINES
WIRE CUTTING MACHINES
NAIL MAKING MACHINES
BARBED WIRE MACHINES

WRITE FOR CATALOGS!

Also — a complete stock of new and used Machine Tools and other equipment.

Use postpaid card. Circle No. 262

NEW!

SPRING & FUSE CLIPS, LOCK WASHER TERMINALS

Order from Zierick stocks for quick delivery. New terminals with #4, 6, 8 holes, spring and fuse clips made from .018 brass or phosphor bronze, not tinned. Special parts quoted from sketches or blueprints. Production on our upright presses or multi-slide machines. Over 500 stampings and wire forms to choose from.

STANDARD ELECTRICAL PARTS delivered FAST!

Lugs • Clips • Terminals
Wire Forms from Stock

Send for your copy of the new Zierick catalog No. 22 TODAY!

ZIERICK MANUFACTURING CORP.

81 Rockdale Ave., New Rochelle, N.Y. • NEw Rochelle 6-8520

Use postpaid card. Circle No. 263

magnetron operating at 2450 Mc with a 1 kw output.

Piped nitrogen, as is found in compressed air, passes through the coil or coaxial cable and is converted into a plasma. Recombination occurs when the nitrogen leaves the field, just past the point where the plasma escapes into the open air. Since it is never consumed, the nitrogen, or other suitable gas, can be used again and again.

The torch generates heat without combustion, and therefore, without oxidation. Another characteristic of the torch is that none of its parts heat.

It is small enough to be mobile, simple in design and easy to construct. The prototype built by Amperex Electronic Corporation, Hicksville, Long Island, N.Y., cost less than $1000.

The torch will permit important and wide applications such as the investigation of missile re-entry, spraying high melting point metals and ceramics, petroleum cracking, welding, chemical purification and processing.

EASTMAN MAKES PLANT DAMAGE ESTIMATE

In an estimate of the damage to the Tennessee Eastman Company plant from the October 4 accident, James C. White, president, issued the following statement.

"The preliminary estimate of the damage to our buildings and equipment, including the aniline plant which was totally destroyed, may exceed $4,500,000. Substantially all property damage was covered by insurance.

"Although continuing effort is being made to determine the cause of the blast, it has not yet been established.

ILLINOIS TOOL EXPANDS FOREIGN PLANTS

Illinois Tool Works, Chicago, Ill. recently expanded its foreign plant capacity by acquiring two new plants in England and Germany. IT-S Ltd, a subsidiary, moved into its own new manufacturing plant and is producing parts for the English markets.

Illinois Tool Works also acquired majority interest in the Albert Thode Co., Hamburg, Germany. The Thode Company supplies fasteners for radio, television, automotive and appliance manufacturers.

Wesley R. Johnson former Chicagoan, is managing director of IT-S Ltd., Slough, Bucks, England, and supervises the company's operations throughout Europe. He was recently elected a vice president of the parent company.

NEW FASTENER COMPANY IN CALIF.

Calfax Incorporated, El Segundo, Calif. has formed to continue development, manufacture and sale of specialized fasteners of the types formerly marketed by the Calinoy Division of Illinois Tool Works.

The new firm has acquired the tooling and inventory of the Calinoy Division. Development effort will be concentrated on special fasteners for the airframe, missile and electronic industries.

Milton A. Miner is president of the new company and Thomas R. Boyd is chief engineer. Both were associated with Calinoy. Sales representatives are Miner and Associates, Inc. with offices in El Segundo, San Francisco and Seattle.

THOMSON INAUGURATES LEASING PLAN

A financing plan will allow purchasers of resistance welding machines the option to lease instead of buy. This option, according to R. P. Hedblom, president of Thomson Electric Welder Co., Lynn, Mass., is being offered so that metal-working plants may obtain modern welding machines and use them over a broader range of assembly operations without materially increasing capital expenditures.

Thomson's plan was formulated with cooperation of General Electric Credit Corporation, the holding firm. In context, it is similar to those currently in use in the machine

tool field. On request, welding machines, either standard or modified slightly to suit a customer's requirements, are leased for a maximum of 60 months. Numerous options are available, including straight time-payment arrangements, in which a customer obtains title to the unit.

HARPER REPORTS 12% SALES INCREASE

H. M. Harper Company today reported a 12 per cent increase in net sales for the nine months ended Sept. 30, 1960.

H. M. Harper, president, said that sales for the period totalled $9,328, 040, as compared with $8,309,336 for the first nine months of 1959.

Net earnings, after taxes, amounted to $507,705 and were equivalent to 97 cents per share on the 486,460 shares of common stock outstanding. For the same period last year, the company earned $565,048, or $1.09 per share.

Harper said the earnings decline, despite the sales rise, was primarily the result of non-recurring expansion expenses.

He stated, however, that their backlog of orders is at a record high, a factor which "should enable the company to show earnings for the year, ending Dec. 31, approximately equal to last year." In 1959 the per share earnings were $1.49, after payment of preferred dividends.

BLACK & DECKER OPENS SAN DIEGO BRANCH

John P. Spain, general manager, Product Service Division, The Black & Decker Mfg. Co., Towson, Md., has announced the opening of a new Black & Decker factory service branch to serve the electric tool market in the San Diego, California area.

MID-AMERICAN FASTENERS UPS NORLANDER

Thomas Stott, president of Mid-America Fasteners, Inc., Franklin Park, Ill., has named Carl Norlander vice president and sales manager. Norlander, who is a graduate of Northwestern University, has been associated with Mid-America Fasteners in sales for the past three years, and has been identified with the fastener field since 1952. He is a member of the American Society for Mechanical Engineers.

ALCOA GIVES INDUSTRIAL DESIGN AWARDS

Two Los Angeles industrial designers Channing Wallace Gilson and Tor Petterson have received 1960 Alcoa Industrial Design Awards. The awards—made to the designer, not to or for the product—were on the basis of entries demonstrating the work of the designer, for one or more products placed on the market during the previous year. The specific designs represented were Gilson's closed circuit tv camera for the Industrial Products Division, International Telephone and Telegraph, San Fernando, Calif., and Petterson's portable wattmeter for Voltron Products, Pasadena, Calif.

TOR PETTERSON, head of Tor Petterson Associates is shown with the Voltron portable wattmeter that he designed.

CHANNING WALLACE GILSON, head of his own design counseling organization, is shown with the ITT closed circuit TV camera.

continued

NEW STAMPED FASTENERS BY CREST PRODUCTS

Available in heat-treated Spring Steel . . . in all popular sizes and finishes.

Crest specializes in custom building fasteners to meet your exacting, individual specifications.

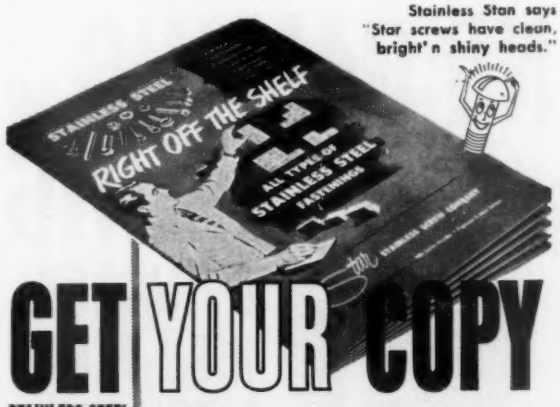
WRITE FOR COMPLETE TECHNICAL DATA

CPI

CREST PRODUCTS, INC.
P. O. BOX 64, UNION, NEW JERSEY

Use postpaid card. Circle No. 264

Stainless Stan says: "Star screws have clean, bright'n shiny heads."



GET YOUR COPY

STAINLESS STEEL
300 & 400 Series
- AN Drilled Fillisters
- Bolts
- Cap Screws
- Cap, Socket Head
- Cotter Pins
- Dowel Pins
- Hinges
- Machine Screws
- Nuts
- Set Socket
- Sheet Metal Screws
- Stud Bolts
- Taper Pins
- Washers
- Wood Screws

STAR'S CATALOG OF
Right-off-the-Shelf ®
STAINLESS STEEL
FASTENERS

Save time . . . save money. This book lists over 8,000 stainless steel fastenings available for immediate delivery RIGHT OFF THE SHELF!

Write for your new catalog TODAY.

CORROSION RESISTANT

STAR STAINLESS SCREW CO.
713 Union Blvd., Paterson, N.J.
CLifford 6-2300 • TWX = LTFSNJ-1382
Direct New York City phone: WIsconsin 7-6310
Direct Philadelphia phone: WAlnut 5-3660

Use postpaid card. Circle No. 265

MOLLY®

JACK NUT

The Only Blind Fastener Which Grips Any Material From 0" To 3/8" Thick

The Jack Nut cuts cost, speeds assembly, solves hitherto impossible fastening problems. Can be used as a rivet and/or blind fastener. It's versatile, easy to use and no special tools are needed.

The only blind fastener with threads which grips any material from 0" to 3/8" thick. Needs only 1/8" expansion space. Allows holes to be fashioned before, during or after fabrication. Hole size is not critical and special type of hole is not necessary.

Made of quality steel, cadmium-plated. Grips evenly on rough as well as smooth surfaces. Provides vibration-proof assembly. Weight-carrying capacity is limited in most cases only by strength of the material in which used.

EASY TO INSTALL

1 Insert Jack Nut into hole. Needs only 3/64" expansion space.

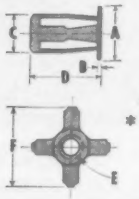
2 Run in screw to collapse spider anchor backing by exerting pull on thread.

3 Jack Nut now is installed and ready to receive attachment screw.

Sold By Wholesale Hardware, Electrical Wholesale & Industrial Supply Distributors

MOLLY® CORP.
2200 N. 5th St., Reading, Pa.

SPECIFICATIONS



CAT. NO.	A CAP DIA.	B CAP THICK.	C BODY DIA.	D O'ALL L'GTH.	E THREAD	F MAX. SPREAD
4-S, JN	15/32	3/64	9/32	9/16	6-32	43/64
4-L, JN	15/32	3/64	9/32	3/4	6-32	43/64
* 6-S, JN	17/32	1/16	3/8	11/16	10-24	25/32
* * 8-S, JN	5/8	1/16	27/64	3/4	1/4"-20	13/16

S for 0" to 3/16"; L for 3/16" to 3/8"
*8-32 & 10-32 threads available
**10-24 & 12-24 threads available
NOTE: 4-S, JN & 6-S, JN also available in brass

Use postpaid card. Circle No. 266

NO GALLING OR SEIZING

DURA-LOC HIGH TEMP LOCK NUT

Exclusive collet-type locking action and free-spinning principle, prevents excessive galling or seizing and assures uniform bolt loading for a given torque. Mid-grip locking feature results in vibration-proof gripping power.

- Installation and removal is fast and simple.
- Dura-Loc nuts provide unlimited reusability.
- Available in sizes up to 7/16" in coarse or fine threads.
- Approved for military applications up to 1600°F.

Write for literature

dc
...Fastener Specialists
THE DELRON COMPANY, INC.
5224 SOUTHERN AVE., SOUTH GATE, CALIF. • LORAIN 7-2477

Use postpaid card. Circle No. 267

PARKER-KALON ASSIGNS FIELD ENGINEERS

PRITCHARD

CARPENTER

Robert Carpenter and William Pritchard have been named field engineers for the Parker-Kalon division of General American Transportation Corp., Clifton, N.J. Both will serve as fastener consultants to industrial distributors and manufacturers.

Carpenter will service Northern Illinois and Indiana, Berrien County, Mich. and Rock County, Wis. Pritchard will service the Carolinas and Southern Virginia.

WHIRLPOOL TO DESIGN SPACE KITCHEN

Dining in outer space will be far removed both figuratively and literally from the normal earthly procedure. Because of the problem of zero gravity any efforts to prepare a recipe or cook a meal during space flight could be disastrous Foodstuffs, cans, pots and pans, knives, forks and spoons would be floating around in mid-air.

To meet the problem of providing all foods and beverages required by three space pilots on a 14 day mission, the Wright Air Development Division awarded a contract to the Whirlpool Corp., St. Joseph, Mich. to design and develop a Space Kitchen. Occupying an area approximately 10 feet long and 7½ feet in diameter, the space kitchen will have a miniaturized thermo-electrically fueled refrigerator and freezer, a three-cavity oven and a built-in 2½ gallon capacity water system. None of these appliances will be used in the same manner as their earthly counterparts.

Much of the food will be processed or dehydrated, and packaged in disposable containers resembling oversize toothpaste tubes. Canned foods such as chicken, ham and eggs, steak, vegetables and miscellaneous solids will be stored in the kitchen at countdown.

Foods requiring heat will be placed in space kitchen oven, where it will automatically heat to 175° in 30 minutes. When the foods are prepared, the astronaut will place a mouthpiece on each container, then place container in a device resembling a squeeze type potato masher. By squeezing the attachment, food will be forced out of the container into the astronaut's mouth.

Following his meal, the astronaut will wash the mouthpieces with specially prepared "wash-n'-dry" cloths.

The problems encountered so far in the design have been in designing the way around the lack of gravity. It is expected that a prototype space kitchen will be completed and delivered to the government by April, 1961.

CRIMMINS CHAIRMAN AT PHILLIPS SCREW

James K. Crimmins of Greenwich, Conn., New York attorney, was elected chairman of the board of the Phillips Screw Co., at the annual meeting of the international firm's directors. He was also elected chairman of the board of directors of Fasteners, Inc., a wholly-owned subsidiary of the Phillips Screw Company. He succeeds John A. Zehntbauer, who was among 10 directors chosen by stockholders.

Crimmins is a native of Yonkers, N.Y. He is a graduate of Fordham University and Harvard Law School. He has been a director of Phillips Screw for the past 12 years.

ATLEE NAMES MGR. OF DEVELOPMENT ENGIN.

Bernard J. Warren has been named manager of development engineering for the Atlee Corp., Waltham, Mass. Atlee is a recent combine of four separate New England based companies, Atlee, Wesco Electrical Co., Inc., Applied Dynamics, and Industrial Electronics Co., Inc.

Warren has been general manager of the Applied Dynamics Division since March of 1960.

A $200 super-alloy spring, 5½ ft long, featured at the National Metal Congress and Exposition is made of Inconel-X alloy wire made by National-Standard Company, Niles, Mich. It is coiled into spring form by Hoosier Spring Company, South Bend, Ind. The end use of the spring is classified.

The spring is made of ¼" diameter wire coiled into a diameter of 2¾". Inconel-X alloy is approximately 69% nickel and 16% chromium, with lesser amounts of iron, carbon, aluminum and titanium. This spring is used at continuous operating temperatures around 500°F.

SPAL GOES WEST FOR ASSOCIATED SPRING

Edward C. Spal, Sr., sales manager of Associated Spring Corporation's Gibson Division at Mattoon, Ill., has been appointed to succeed Charles M. Holnback as general manager of the firm's Seaboard Pacific Division, Gardena, Calif. Troy L. Sorensen, sales supervisor of Chicago sales office, replaces Mr. Spal. Holnback remains as a director of the corporation.

SALES STAFF CHANGES AT BRISTOL

MUELLER

HELLMANN

Ralph T. Mueller, former St. Louis district representative and midwest regional manager, has been appointed assistant to the Socket Screw division sales manager of The Bristol Co., Waterbury, Conn. His headquarters will remain in St. Louis.

Richard E. Hellmann has been appointed sales representative for the company's Indiana area. Prior to joining Bristol, he was associated with Midwest Tool and Supply Co., St. Louis.

LEAR RECEIVES FRENCH AIRCRAFT AWARD

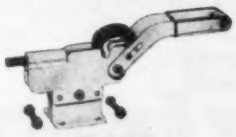
William P. Lear, founder and chairman of Lear, Inc., Grand Rapids, Mich., was awarded the Great Silver Medal of Paris for his contribution to aircraft safety throughout the world.

Julien Tardieu, president of the French Municipal Council referred to Lear's pioneering discoveries in aircraft autopilot equipment in making the award. Present at the award ceremony were a number of French government and industrial dignitaries.

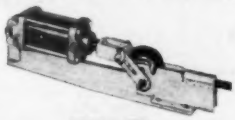
Lear is a previous recipient of the Collier Aviation Trophy and the Frank M. Hawks Memorial Award.

NOW! KNU-VISE GIVES YOU PUSH-PULL CLAMP CONTROL

P&P-1200
Hand Push-and-Pull Clamp



P&PSB-1200
Hand Push-and-Pull Swivel-Base Clamp



AOP&P-1200
Push-and-Pull Air-Operated Clamp

WRITE TODAY FOR COMPLETE INFORMATION

Push the handle! Pull the handle! It makes no difference—the new Knu-Vise clamps by Lapeer give you uniform clamping of parts. That's real performance! Look at these features—

90° handle motion produces lock of plunger for push or pull without resetting of handle. Handle is reversible. Plunger guided by two widely separated, hardened steel bushings for accuracy in motion and minimum wear. Built-in deflection provides uniformly tight clamping of parts with normal variation in thickness. Swivel base model provides 90° total change in direction of plunger motion. The air (or oil) operated model, AOP&P-1200, produces approximately 4½ times the clamping force with 85 p.s.i. than the cylinder would alone. Failure of air (or oil) pressure does not permit reverse motion of plunger, thus not affecting clamping force.

All parts easily replaceable.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS | LAPEER MANUFACTURING CO.

3070 DAVISON ROAD
LAPEER, MICHIGAN

WESTERN DIV.: PECK and LEWIS CORPORATION
4436 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7148
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.
1131 Pettit Road, Burlington, Ontario

Use postpaid card. Circle No. 268

Industry's NEWEST Production TOOL

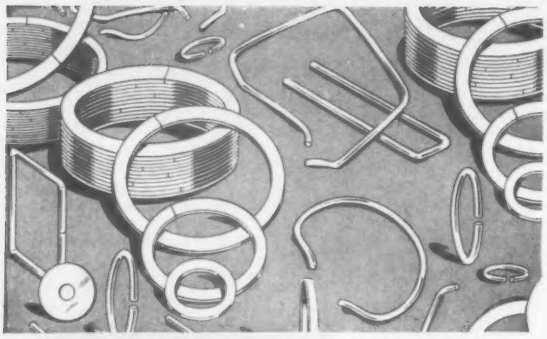
MOLYKOTE® G LUBRICANT

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
- THE HIGHER THE LOADS, THE GREATER THE MARGIN OF SUPERIORITY OF MOLYKOTE G

Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA-MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone Fireside 8-3724. Plants in Stamford, Conn., Munich, Germany and Strasbourg, France.

THE ALPHA-MOLYKOTE CORP. AFE-12
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.
NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

Use postpaid card. Circle No. 269



ALUMINUM

brazing

with **preforms**

In Sizes and Shapes To Do Your Brazing Job Better

1. **Notch Coil Rings** — No Tangling Problems.
2. **Edgewound Washers** — No Blanking Scrap Losses.
3. **Blanked Washers** — Close Tolerance From Thin Sheet.
4. **Special Shapes** — Rectangles, Ovals, U-clips, Segments and Many Others.

Available in these Alcoa alloys

718 Brazing Wire and Sheet

716 Brazing Wire

713 Brazing Sheet

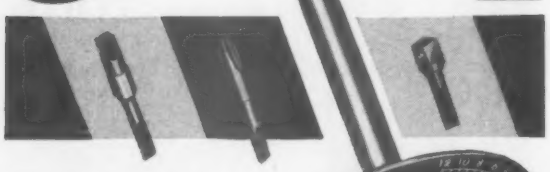
Write for 16 page booklet *on better brazing*

LUCAS-MILHAUPT *Engineering Co.*

5060 South Lake Drive, Cudahy, Wisconsin

Use postpaid card. Circle No. 270

3 PRECISION TOOLS IN 1



Designed for close tolerance, low range tightening, this 3-way Apco Mossberg torque tool can be used as a vertical type wrench . . . or as a torque screw driver, with either slotted or recessed bits. Simple, quick changing of bits permits accurate measuring of tension for a wide variety of electrical, electronic, instrument assembly or repair work. High quality Apco workmanship includes thrust bearings to minimize friction. Easy-to-read white on black indicator dial. Available in 13 sizes for inch-gram, inch-ounce, and inch-pound readings. Socket head bits also available. Write for details.

APCO MOSSBERG COMPANY

215 Lamb Street, Attleboro, Mass.

Use postpaid card. Circle No. 271

AWS TO CONVENE IN NEW YORK

The American Welding Society will hold its 42nd annual convention and welding exposition and act as host to the International Institute of Welding, in New York, April 10 - 21, 1961. The I.I.W. will meet April 10 - 15 at its headquarters hotel, the Sheraton-Atlantic, Broadway and 34th Street, New York, and remain for the AWS Meeting and Welding Show which will take place the following week. AWS Technical Meetings will be held in the Commodore Hotel, 42nd Street, New York, April 17 - 21, and the Welding Show in the New York Coliseum, April 18 - 20, 1961. For further details write to the Information Center, American Welding Society, 33 West 39th Street, New York 18, N.Y.

HUNTER SPRING APPOINTS FIELD ENGINEER

Hunter Spring Co., Lansdale, Pa., announces the appointment of Mark Reeve as field engineer for a territory comprised of Eastern Michigan and Northern Ohio. Reeve is a graduate of Princeton University. He has been associated with The Industrial Cable and Sling Company, Wire Rope Corporation of America, and the Electric Range Division of Philco Corporation.

REPUBLIC FILLS ENGINEERING POST

Appointment of Harry A. Pearl as supervising engineer of the materials laboratory at Republic Aviation Corporation's Research and Development Center has been announced by Dr. Samuel Korman, chief of the laboratory.

Pearl comes to Republic from Bell Aircraft's Engineering and Research Laboratories, where he was chief materials engineer for the past six years. Before this, he worked at the Air Research and Development Command, Wright Air Development Center, Dayton, Ohio.

EASTMAN CHEMICAL ELECTS OFFICERS

FORD

EILERS

Henry L. Ford has been elected president of Eastman Chemical Products Inc., Kingsport, Tenn. He succeeds Dr. L. K. Eilers who became vice chairman of the board of directors.

Ford began his association with Tennessee Eastman in 1922, and has held positions in the sales and purchasing divisions. Dr. Eilers is also first vice president of Tennessee Eastman and Texas Eastman. He joined the parent organization in 1934.

BLACK AND DECKER NAMES PLANT MGR.

John L. Turnbaugh has been appointed manager of the Black and Decker Mfg. company's Towson, Md. plant. He replaces Karl B. Salanda, who has resigned his position with the company. Turnbaugh's position just prior to the current appointment was tool engineering manager.

U.S. STEEL PLANS NEW LABORATORY

Gary Steel Works of U.S. Steel Corporation will be the site of a new four-building metallurgical laboratory.

The metallurgical laboratory will be devoted to conducting mechanical and physical tests of steel products and will include a machine shop for cutting and shaping samples for testing.

The ceramics laboratory will be used for conducting tests for quality and control of refractory materials used in the construction of high temperature furnaces required in steel making.

Buildings will be constructed with curtain wall enameled steel panel, and will be fabricated and erected by U.S. Steel's American Bridge Division.

IBM REPORTS IMPROVED TUNNEL DIODES

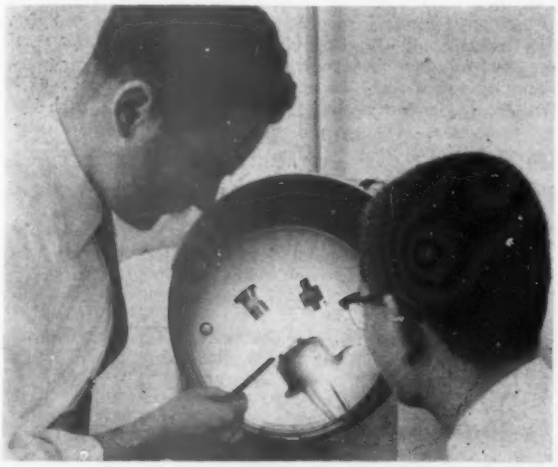
A greatly improved tunnel diode, which switches at speeds faster than 0.4 of a billionth of a second, promises far greater speed and reliability for tunnel diode circuits.

Basic computer circuits known as binary triggers, used in performing arithmetic, can now operate at speeds 5 to 10 times faster than previously designed units. The new diode will require much less power than present units would in comparable circuits.

A second new tunnel diode, somewhat earlier in the experimental stages than the first has high speed and other improved characteristics which make it look promising for use in computer storage circuits.

Key to the design advances behind the two devices is a new fabrication method which involves an electronically monitored and controlled etching technique.

To provide automatic control of the etching process, an ac pulse(the top half of the sine wave) "interrogates" the diode being etched. These pulses are continually compared with similar pulses generated across a reference tunnel diode. When the pulses match, the desired peak current is reached and the etching is automatically stopped and the junction washed.



USING OPTICAL COMPARATOR, Dr. E. M. Davis, IBM Data Systems Division, points to conventionally packaged diode, while he and his colleague, S. S. Im, compare physical characteristics to newer "rivet" and "micro-wedge" diodes.

Both types of diodes were fabricated using a novel servo-etching technique that sprays a fine jet of etching solution through a window cut into the ceramic material surrounding the germanium pellet. This technique can be used with either the "rivet" or "micro-wedge" package design. Choice of the package depends upon the type of printed circuit board in which the diode would be used.

The two new diodes and the new fabrication developments were described at a meeting of the IRE Professional Group on electronic devices by Dr. Edward M. Davis of IBM Data Systems, Poughkeepsie, N.Y.

UNIVERSAL MATCH NET 25% OVER 1959

Universal Match Corporation's net income for the first nine months of 1960 was $4,021,000, an increase of 25 per cent over the comparable period last year. Earnings per share of common stock were 93 cents for the nine months as compared with 74 cents in 1959. The company's sales and earnings figures do not include those of the Glasco Corporation, Muncie, Ind., acquired recently by Universal.

A-C-E NAMES GANZHORN

Donald W. Ganzhorn, former vice president of A-C-E Equipment Co., Cleveland, has been named senior application engineer, Industrial Generators.

He is an electrical engineering graduate of the University of Michigan.

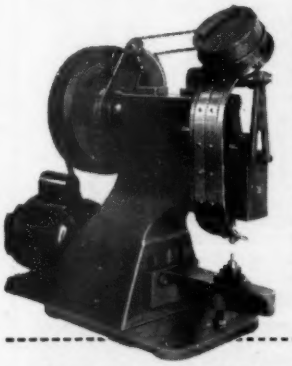
continued

look into eyelets your FASTENING to solve PROBLEM

Edward Segal

AUTOMATIC EYELETING MACHINERY

single & multiple settings for product improvement and continuing savings



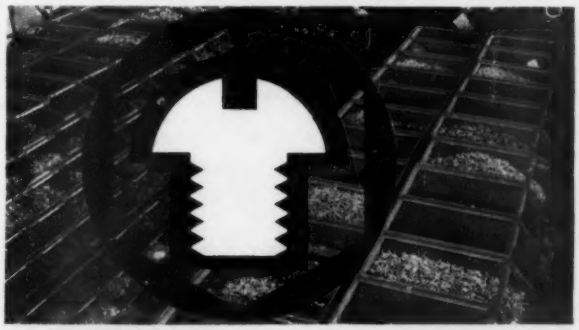
Manufacturers who introduce precision built Edward Segal eyeleting machines to their fastening jobs find they require less handling and production time over other methods—and the machines are complete with no adaptation necessary. Eyelets usually cost much less, and the fastening looks far better.

Depending upon your operation, these highly reliable machines can be supplied with varying degrees of automation. Feeding is simplified, and because of the Limited Travel Spindle (pat. pend.), even settings as small as .032" I.D. are possible with a minimum of tool breakage.

Let Segal engineers study your fastening problem without obligation. Write for details to section AFE-12

EDWARD SEGAL • 132 LAFAYETTE STREET, NEW YORK 13, N. Y.
Manufacturers of eyeleting machinery, special hoppers and feeding devices

Use postpaid card. Circle No. 272



Get your

specials or standards in Stainless or Nylon from ANTI-CORROSIVE

Pioneers in stainless steel and Nylon fasteners, Anti-Corrosive has served American manufacturers for 35 years.

Send us your drawings and specs. Or order from our vast stock of standard fasteners for same day shipment.

ANTI-CORROSIVE METAL PRODUCTS CO., INC.

Office & Factory: Castleton-on-Hudson 11, New York
Mailing Address: P. O. Box 1894E, Albany 1, N.Y. Phone: PErshing 2-7711
(direct line from New York City) JUdson 2-7370 Teletype: Castleton 353

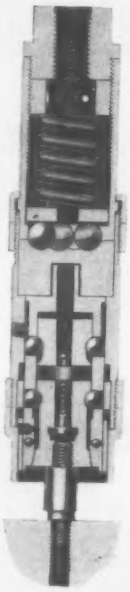
West Coast Warehouse: 2922 East Olympic Blvd., Los Angeles 23, Calif.
Telephone: ANgelus 8-5131—Teletype: Los Angeles 212

Use postpaid card. Circle No. 273

NEW

Controlled (Torque) Drive

STUD DRIVER



. . . for Stud Driving applications requiring limited torque while driving the stud

A necessity where a limited amount of torque is desired—as in driving shoulder studs.

As shown in the sectional view, this new tool has an adjustable over-running clutch so that the stud can be driven to any predetermined torque. Simple adjustment is made by removing the two Allen screws in the spring adjusting nut (directly above spring) and moving it downward for increased torque, or upward for decreased torque. It is not necessary to stop rotation at any time while driving studs. Other outstanding Titan Stud Driver features are an automatic take-up for jaw wear, and an inexpensive method of changing the cam ring.

While not designed for use with impact wrenches it is an ideal tool for use with any air or electric drill or drill press at constant speed. Available in sizes No. 101, No. 102 and No. 103.

Write for details and prices

TITAN TOOLS — World's Largest Producers Of Stud Drivers And Pullers

TITAN TOOL CO.

47 MAIN ST., FAIRVIEW (ERIE COUNTY), PA.

Use postpaid card. Circle No. 274

Why is **SPIROL** *the true spring* **PIN** a better fastener?

SPIROL PIN comes in Medium, Light and Heavy Duty . . .

In a majority of applications, the Medium Duty SPIROL PIN satisfies all requirements, and gives cost savings through increased production by easier and faster insertion. Application in materials too soft, brittle or thin for heavier spring pins is possible with Medium and Light Duty SPIROL PINS.

Miniature Diameters . . . SPIROL PIN is the only spring pin available in 1/32" to .052". And, in diameters as large as 3/4".

Uniform chamfer on ends of every SPIROL PIN . . . insures ease of insertion, without hole damage or distortion.

Write for free TECHNICAL DATA MANUAL. Free samples for specific applications.

C. E. M. COMPANY

30 SCHOOL STREET, DANIELSON, CONN., ● PRescott 4-8571

Use postpaid card. Circle No. 273

WATERBURY FARREL PROMOTES ECKERT

John E. Eckert has been appointed vice president in charge of engineering at the Waterbury Farrel Foundry and Machine Co., Waterbury, Conn. He has had substantial engineering experience with American Rolling Mill Co. and the Armzen Co. At the time of the merger of the Armzen Co. with Waterbury Farrel, in 1956 he became chief engineer of the rolling mill division.

Andrew J. Beck, became the chief engineer of the rolling mill division of the company, succeeding John Eckert.

Lawrence J. Litalien has been appointed purchasing agent. He has been with the company since 1936, and was in charge of outside purchasing of castings before his present appointment.

RECORD 9 MONTH SALES FOR AIR REDUCTION

Sales of Air Reduction Company, Inc., for the nine-month period ending September 30, 1960, were a record $155,488,564, compared with sales of $151,052,893 for the first nine months of 1959, the previous record high. Net income for the first nine months of 1960 was higher than the similar period in 1959. Earnings per share of common stock during the first nine months of 1960 were $2.98, as compared with $2.94 for the first nine months of 1959.

NEW PRESIDENT AT MYSTIK ADHESIVES

Robert J. Leander has been elected president of Mystik Adhesive Products, Inc., Chicago. He succeeds Russell J. Leander, founder of the company who has been elected chairman of the board. Robert D. Smith has been named executive vice president. Robert J. Leander has been president of Chicago Show Printing Company and will continue as chairman of this company.

AIRCRAFT PIONEER RETIRES IN NOVEMBER

Charles J. McCarthy, a pioneer in the aircraft industry, will retire in November as chairman of the board of Chance Vought Aircraft, Incorporated, Dallas, Texas.

A past chairman of the board of governors of the Aerospace Industries Association and past president of the Institute of the Aeronautical Sciences, McCarthy has served also as a member of the National Advisory Committee for Aeronautics, the government's foremost research committee in the aeronautical field. He was appointed by President Eisenhower in 1957 and served until the NACA was succeeded late in 1958 by the new National Aeronautics and Space Administration (NASA).

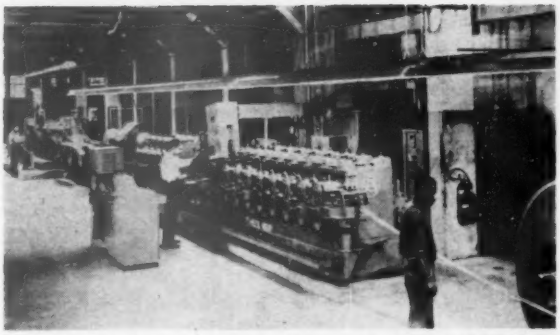
NEW SALES MANAGER AT POP RIVET

Jack H. Schofield has been appointed product sales manager for Pop Rivet Division, United Shoe Machinery Corporation, Shelton, Conn. He was formerly assistant product sales manager for the company. Schofield will supervise training for the 250 industrial distributors handling the line.

Prior to joining the organization in 1957, he was employed by the York Corporation and York Division of Borg-Warner Corporation as an industrial engineer.

SYNFLEX APPOINTS SALES CORRESPONDENT

Burton E. Snyder has been appointed sales correspondent of the Synflex Products Division of Samuel Moore & Co., Mantua, Ohio. Snyder has been with the company fifteen years.



FIRST U.S. COMMERCIAL PRODUCER of electronically welded copper and brass tubing, Tubotron, Inc., Newark, N.J., employs a high-frequency welding process which gives operation capability to make tubing with closer gauge tolerances than extruded or drawn tubing. This high-speed production line can make electronically welded tubing from all metals, including exotic alloys, in diameters from 1/2 to 3 1/2"

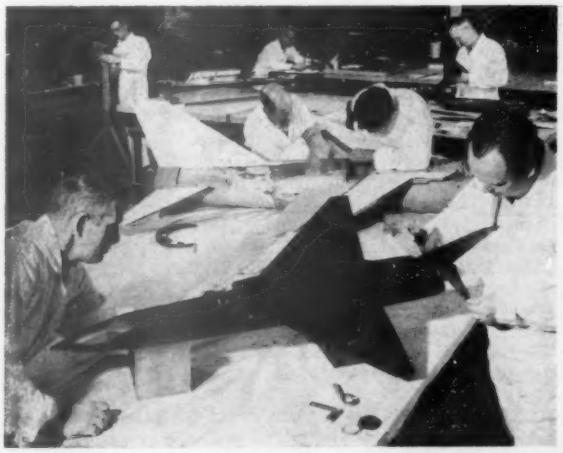
EMERSON ELECTRIC APPOINTS WIGHTMAN

Lawrance W. Wightman has been appointed assistant to the vice president in charge of operations of Emerson Electric Manufacturing Company. He will be responsible for manufacturing research and development for Emerson's Commercial Division. Wightman comes to Emerson Electric from General Electric, where he served in a broad range of engineering positions, especially in the design development and manufacturing planning of motors.

MODEL DESIGNERS MOLD AIRPLANE'S FUTURE

In the Boeing model shop at Wichita, Kansas, skilled craftsmen literally hold the airplane's future in their hands. They are part of several hundred model builders, designers, instrumentation experts and shop workers whose specialized assignment is transforming new aircraft concepts into precisely detailed models, used primarily for wind tunnel testing.

Boeing model shops, integrated with special design areas and instrumentation laboratories, annually produce about 200 models of new or revised design configurations. Although used mainly for wind tunnel tests, one-tenth scale models have been constructed for such unusual uses as free flight telemetered drop tests from 40,000 feet, accelerating to supersonic speed prior to ground impact.



The Boeing wind tunnel complex at Seattle ranks among the nation's largest and most versatile privately owned installations. It includes aerodynamic wind tunnels, with companion working scale models, covering transonic, supersonic, and hypersonic speed ranges. A fourth major wind tunnel facility, of the arc-discharge type, now being placed in operation, will increase test capabilities to orbital speeds.

continued

there are **MOORE SET SCREWS**

exactly right for any job . . . and you can get them FAST

Dependable delivery — ample production capacity assures that you get any order, large or small, on schedule.

Uniform high quality — modern equipment and methods and rigid quality control guarantee precision quality.

Advice of specialists — expert engineering assistance, backed by 80 years of experience, is available to help solve problems.

Moore set screws simplify design, purchasing, production. Send for price catalog.

MOORE SET SCREWS

George W. Moore, Inc.
since 1880
91 Beaver St., Waltham 54, Mass.

Use postpaid card. Circle No. 276

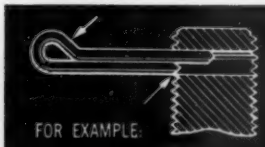
EVERY KIND, SHAPE, SIZE COTTER PIN

for any specific purpose or general mechanical use is manufactured by

WESTERN WIRE PRODUCTS COMPANY
1457 S. 18th • St. Louis 4, Mo.

Western Wire makes the largest and most complete line of cotter pins in the U.S. WW Cotter Pins are consistently accurate even in complicated shapes — designed and produced in strict accordance to specifications.

Write for prices and samples too, if wanted.



FOR EXAMPLE:
Castle Cotter
COTTER PINS

Expressly made for castellated, grooved and special nuts.

NO HAMMER DAMAGE TO VALUABLE FITTINGS

Fig. 1—Offset head countersinks with no forcing.

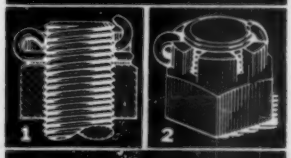
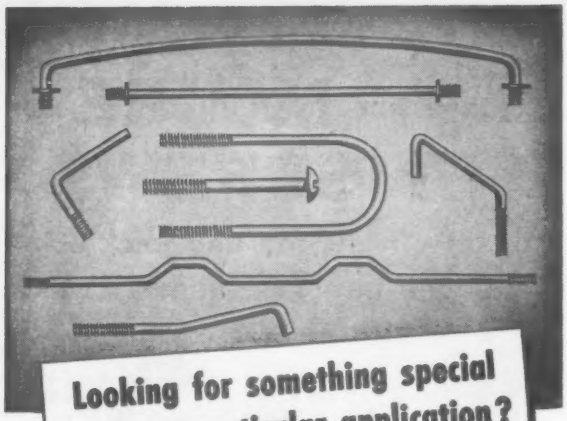


Fig. 2—Long prong is designed to clinch back to maximum "safe" position; holds nut securely.

SIZES AVAILABLE TO MEET ANY REQUIREMENTS FOR INDUSTRIAL AUTOMOTIVE AND AIRCRAFT USE. AVAILABLE IN A-N 380 & 381 SPECS.

Use postpaid card. Circle No. 277



Looking for something special ...for a particular application?

...rely on Ohio Rod Products for—

SERVICE—QUALITY—UNIFORMITY

OHIO ROD makes Special Headed and/or Threaded Fasteners in short and long length — in short or long runs. Headed, Threaded, Collared, Bent, or Offset.

Send drawings or blueprints for quotes and literature.

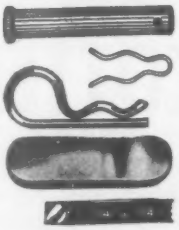
OHIO ROD PRODUCTS CO., INC.

20258 1st AVENUE • BEREA, OHIO

Use postpaid card. Circle No. 278

LEITZKE a reliable LOW COST SOURCE for

- CLEVIS PINS .....
- HAIRPIN CLIPS .....
- HAIRPIN COTTERS .....
- MACHINERY KEYS ..... (Round or Square Ends)



Send for **FREE** Catalog

REIN LEITZKE • Dept. A • HUSTISFORD, WIS.

Use postpaid card. Circle No. 279

BOLTS 'N NUTS FROM REPUBLIC

"I want a box of carriage bolts."

Adv. Republic Steel

Use postpaid card. Circle No. 280

AM.-STD. ADDS VALUE ANALYSIS POSITION

A. F. L. Anderson has been named director, value analysis for American-Standard Industrial Division. The new position will be a staff function and will involve analysis of the efficiency of product designs and production methods.

Anderson, a mechanical engineering graduate of the University of Michigan, has been with American-Standard since 1925. Prior to his new appointment, he was director, product development, air conditioning equipment, for the division.

WEINER JOINS PHILCO AS ENGIN. V-P

James R. Weiner has been appointed vice president-engineering for Philco Corporation's Government and Industrial Group, Philadelphia.

Before joining Philco, Weiner was associate director of research and manager of the communications and control system for satellite programs at the Lockheed Missiles and Space Division at Palo Alto, Calif. Prior to joining Lockheed, he was assistant vice president for engineering with Remington-Rand Univac, a division of the Sperry-Rand Corporation.

He was closely associated with development and design of the BINAC and UNIVAC systems, the solid-state UNIVAC, and the LARC, an ultra high speed, solid-state computing system.

RCA OPENS INDUSTRIAL OFFICE IN DAYTON

The Industrial and Machine Tool Division of Radio Corporation of America announces the opening of a district office in Dayton, Ohio and has named Edward M. Armstrong district manager. The office will serve Ohio, Kentucky, Tennessee, Missouri and Kansas.

Armstrong, a native Daytonian, has been with RCA in Detroit for two years. Prior to that he was affiliated with the Sheffield Corporation.

CONAP APPOINTS CHEM. DEVELOPMENT MGR.

Mark V. Goodyear joins Conap, Inc., Olean, N.Y. as manager of chemical development. Goodyear, a graduate of Cornell University, worked on vinyl resin technology at Union Carbide, and epoxy resin applications and developments as technical director of Hysol Corporation.

NEW SALES MANAGER AT AMERICAN SEALANT

Charles E. Heilig, Jr. has been appointed sales manager of the American Sealants Company, Hartford, Conn. Prior to his appointment, Heilig served as sales manager of the Pop Rivet Division, United Shoe Machinery Corporation.

Heilig graduated from the University of Pennsylvania. He spent several years as a design engineer in Philco's radar laboratory, then transferred to the appliance division where he received three patents for his work on refrigerators.

ALLIS-CHALMERS ADDS TWO ENGINEERS

Two newly created positions in the West Allis, Wis. plant of Allis-Chalmers have been filled. C. L. Brisley is chief industrial engineer and L. M. Dings, Jr. is chief production engineer.

Brisley joins the company from a Chicago management consulting firm and Dings has been with Allis-Chalmers since 1941, holding the post of superintendent of utility services. For the past three years he has headed the architectural liaison group for C Stellarator facility at the James Forrestal Research Center, Princeton, N.J.

Index to Products Advertised

Adhesives, 17
Alloys, brazing, 82
Assembly line accessories, 5
Assembly machines, 64
Assembly tools, manual, 82
Assembly tools, portable power, 11, 18, 26, 52
Assembly tools, stationary power, 5, 63
Bolt installation machinery, 5
Bolts,
  Blind, 62
  Carriage, 12, 86
  Sealing, 10
  Standard, 79
  Stove, 12
Brazing preforms, 82
Bushes, tension, 14
Bushings, 87
Buttons, push-on, 67
Clamps, 36, 47, 81
Clips, 31, 33, 62, 78
Cold heading machinery, 78
Cold heading, custom, 2nd C, 59
Connectors, wire, 33, 67
Drivers, stud, 84
Drivers, threaded insert, 26
Drivers, torque control, 18, 49, 82
Engineering service, 2nd C, 15, 18, 20, 22, 31, 32, 33, 34, 37, 49, 55, 59, 63, 64, 83, 87, 3rd C
Eyelets, 56, 67
Eyeletting machinery, 56, 83
Fasteners
  Aircraft, 8, 22, 37, 51, 74
  Blind, 22, 55, 62, 80
  Cold headed, 2nd C, 37, 40, 46, 59, 60, 87
  Corrosion resistant, 43, 71, 75, 79, 83
  Locking, 3, 6, 32, 41, 46, 48, 51, 58, 73, 80, 87
  Machined, 87
  Nylon, 83
  Offset, 37, 86
  Panel, 8, 20, 71
  Preassembled, 2nd C, 44
  Quarter-turn, 8, 71
  Quick release, 58
  Sealing, 10
  Snap, 67
  Special, 2nd C, 21, 22, 34, 37, 40, 59, 60, 65, 70, 79, 83, 86, 87
  Spring, 47, 84
  Standard, 2nd C, 12, 22, 34, 37, 40, 44, 55, 60, 82, 75, 79, 83, 85, 87, 4th C
  Weld, 46, 87
Ferrules, 67
Grommets, 67
Hinges, 79
Inserts, threaded, 3, 26, 59, 80, 3rd C
Keys, 86
Latches, 15
Lubricant, 81
Lugs, 67, 78
Nail, special, 21, 60
Nut driver, 5, 52
Nuts
  Acorn, 65, 79
  Aircraft, 41
  Anchor, 80
  Blind, 22, 62, 80
  Brass, 46
  Clinch, 46
  Conduit, 87
  Finished, 87
  Hex, 6, 32, 41, 46, 73, 80, 87
  Lock, 6, 32, 41, 46, 73, 80, 87
  Machine, 12, 87
  Preassembled, w/washers, 2nd C, 41, 65, 79
  Push-on, 65
  Screw machined, 87
  Special, 2nd C, 31, 41, 65, 80
  Square, 87
  Standard, 2nd C, 6, 12, 31, 41, 79, 80
  Weld, 46, 87
  Wing, 79, 87
Nut running machinery, 5
Parts
  Coldheaded, 78
Pins
  Clevis, 86
  Cotter, 79, 85, 86
  Dowel, 24, 79
  Locking, 51
  Spring, 84
  Taper, 79
Rivets
  Blind, 67
  Hand driven, 67
  Panel, 67
  Sealing, 10
  Solid, 60, 72
  Special, 60, 67, 70
  Split, 67, 72
  Tubular, 60, 72
Riveting machines, 5, 74
Rods, threaded, 86
Screwdrivers, Phillips, 34
Screwdrivers, power, 5, 34, 72
Screwdrivers, torque, 52, 82
Screw machines, 64
Screws
  Cap, 2nd C, 48, 75, 79
  Dowel, 37
  Drive, 12
  Hex, 44, 48, 55, 75, 79, 85, 4th C
  Locking, 40, 44, 48
  Machine, 12, 44, 79
  Phillips, 34, 40, 44
  Sealing, 10
  Sems, 2nd C, 37, 40, 44, 59
  Set, 27, 75, 79, 85, 4th C
  Shoulder, 59
  Special, 2nd C, 37, 59, 70, 83
  Standard, 2nd C, 37, 44, 55, 60, 70, 79, 83, 85
  Tapping, 12, 44
  Terminal strip, 40
  Thread cutting, 40
  Thumb, 37
  Wood, 12
Studs, collared, 8
Studs, 12, 60
Tapping machinery, 58
Terminal blocks, 33
Terminals, 67, 78
Thread rolling machinery, 57, 78
Torque driver, 34, 82
Torque wrench, 73
Torque wrench adapter, 82
Washers
  Flat, 47, 79
  Lock, 25, 40, 47, 78
  Spring, 47
Wire, cold heading, 78
Wire cutters, 78
Wire drawers, 78
Wire forms, 78
Work holder, 68
Work positioners, 66
Wrenches, hand, 16
Wrench, end, 16
Wrench, impact, 5

"Must have dropped another miniature fastener."

CONDUIT LOCKNUTS — Up to 6"
WELD NUTS Square & Hexagon
MACHINE SCREW & FINISHED NUTS
STOP-NUTS
WING NUTS
SPRING-NUTS
WAFFLE FACE LOCKNUTS
LOCKNUTS Reversible — One Piece
SWITCH MOUNTING NUTS
COLD HEADED PLUGS & BUSHINGS
LOCKNUTS Deflected Top
IMPACT EXTRUSIONS
Available in Stainless Steel, Brass, Aluminum and Steel
JACOBSON NUT MFG. CORP. Kenilworth, New Jersey

Use postpaid card. Circle No. 281

SEND FOR YOUR FREE COPY!

TA's new Manual 210G gives you 94 pages of prints, tables, illustrations, specs and installation tips.

Save money for your company. Conserve your valuable time. Don't design clamps when TA offers you 40,000 of them to choose from at off-the-shelf prices!

This free manual shows all sizes and styles of loop clamps, bonding clamps, multiple clamps, center clamps, wire harness clamps, wave-guide clamps—plus blocks, brackets, busbars, line supports, and related items.

Sizes from ⅛" to 6" diameter in 16ths for bolt mountings from #4 to ⅜". Available in aluminum, steel, and stainless. All manner of high and low temperature insulation materials.

Put this free manual to work for you! Write TA today.

TA *Mfg. Corp.* 4607 Alger Street
Los Angeles 39, Calif. (or call CH 5-3748)
TWX 9863 Glendale, Calif. • WUX CAT Los Angeles, Calif.

Use postpaid card. Circle No. 282

CONTENTS in this issue

Don't overlook these articles

FEATURES

28—Vend Units Require Built-In Reliability
How sales dispensing machines are designed and built to provide dependable service.

35—Readers Forum: Lubrication vs. Torque
Supplementary data to September story on effect of lubrication on bolt torque.

38—A Look at Corrosion-Resistant Fasteners
Presenting the case for specifying non-ferrous or stainless steel fasteners.

42—Metal Boards Economize Harness Assembly
Perforated aluminum boards obsolete plywood boards at Raytheon.

45—Simple Tools Facilitate Motor Assembly
Changeover from automatic machines to hand tools leads to better over-all net economy.

48—Indexing Unit Speeds Component Soldering
Semi-automatic machine produces one soldered assembly every 10 seconds.

IDEAS AND REPORTS

13—Electronic Scanner Masterminds Welding
Unit automatically controls and keeps record of welding on 658-ft line at Chrysler.

16—Black Light Inspects Circuit Boards
Residual flux readily detected on printed circuit boards.

19—Plastic Capped Bolts Resist Corrosion
Report on method developed to cap large bolts used in glass-lined silos.

20—Cable Markers Save 500 Man-Hours
Slash installation time on 200 process control panels.

20—Adhesive Aids Design Miniaturization
Used at more than a dozen points in assembly of Sonotone hearing aid.

21—Find New Use for Work Positioners
Hughes electronics plant utilizes work holders in total work environment units.

DISTRICT MANAGERS • Assembly and Fastener Engineering

EASTERN DIVISION

Dan E. Reardon, V.P.
Hitchcock Publishing Co.
551 Fifth Ave.
New York 17, N.Y.
MUrray Hill 7-6310
Home Address: Box 1
South Glastonbury, Conn.
Home Telephone: MEdford 3-7083

NEW ENGLAND

John Pickering Jr.
Hitchcock Publishing Co.
Box No. 29—Holt Road, Andover, Mass
Telephone: GReenleaf 5-0499

NEW YORK METROPOLITAN AREA, EASTERN PENNA., EASTERN N. Y. STATE, N. J. MD., DELA., D. of C. and VIRGINIA

Ralph B. Payne
Hitchcock Publishing Co.
551 Fifth Ave.
New York 17, N.Y.
MUrray Hill 7-6310
Home Address: P.O. Box 1
New Providence, N.J.
Telephone: Crestview 7-6166

CENTRAL DIVISION

NORTHEASTERN ILLINOIS, INDIANA

Henry J. Smith, V.P.
Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrose 5-1000

MICHIGAN (except upper peninsula)

William E. Jacobs
Hitchcock Publishing Co.
10432 W. McNichols
Detroit 21, Michigan
Telephone: DIamond 1-9525

WESTERN NEW YORK STATE, WESTERN PENNSYLVANIA, NORTHEASTERN OHIO

Ralph E. Helfrick
Hitchcock Publishing Co.
Heights-Rockefeller Bldg.
3107 Mayfield
Cleveland 18, Ohio
Telephone: YEllowstone 2-9885

CENTRAL AND SOUTHERN ILLINOIS, IOWA, UPPER PENINSULA MICH., MINNESOTA, MISSOURI, SOUTH DAKOTA AND WISCONSIN

Harry E. Hosmer
Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrose 5-1000

CENTRAL SOUTHERN OHIO, KENTUCKY

Arthur V. Baumann, Jr.
1410 Wynnburn Park Drive
Cincinnati 38, Ohio
Telephone: Blackburn 1-2987

OHIO COUNTIES: LUCAS WILLIAMS AND FULTON

James C. Stewart, V.P.
Hitchcock Publishing Co.
Heights-Rockefeller Bldg.
3107 Mayfield
Cleveland 18, Ohio
Telephone: YEllowstone 2-9885

WESTERN DIVISION

CALIFORNIA, ARIZONA

Keith H. Evans
3723 Wilshire Boulevard
Los Angeles 5, California
Telephone: DUnkirk 8-2981
and
Room 225—515 Market St. Bldg.
San Francisco 5, California
Telephone: YUkon 2-4280

OREGON, WASHINGTON

Lloyd Thorpe
766 Dexter Horton Building
Seattle 4, Washington
Phone: MAin 2-4363

A.P.M. CORPORATION 10
ACME INDUSTRIAL COMPANY 24
ALLEN MFG. COMPANY 27
ALLMETAL SCREW PRODUCTS COMPANY, INC. 70
ALPHA-MOLYKOTE CORPORATION, THE 81
AMERICAN MACHINE & FOUNDRY COMPANY (Thompson-Bremer & Company) 40
ANTI-CORROSIVE METAL PRODUCTS COMPANY, INC. 83
APCO MOSSBERG COMPANY 82
AVNET ELECTRONICS COMPANY 20

BASSICK COMPANY, THE (Division of Stewart-Warner Corporation) 36
BEHR MACHINERY & EQUIPMENT CORPORATION 78
BOOTS CORPORATION Third Cover
BRISTOL COMPANY, THE (Socket Screw Division) 75
BUCKEYE TOOLS CORPORATION 63

C. E. M. COMPANY 84
CAMLOC FASTENER CORPORATION 71
CHICAGO PNEUMATIC TOOL COMPANY 4, 5
CHICAGO RIVET & MACHINE COMPANY 74
COOK & CHICK COMPANY 64
CREST PRODUCTS, INC. 79

DELRON COMPANY, INC., THE 80

EATON MFG. COMPANY (Reliance Division) 44
ELASTIC STOP NUT CORPORATION OF AMERICA 41
ELCO TOOL & SCREW CORPORATION 37

GAGNIER FIBRE PRODUCTS COMPANY 62
GARDNER-DENVER COMPANY 11
GARRETT COMPANY, INC., GEORGE K. 47
GILLEN COMPANY, JOHN (Subsidiary of Stanray Corporation) 14
GOODRICH AVIATION PRODUCTS, B. F. (Division of The B. F. Goodrich Company) 22
GRIP-NUT COMPANY 46

HASSALL, INC., JOHN 60
HEADER HEAT TREAT (Division of Howell-Penncraft Corporation) 64
HELI-COIL CORPORATION 26
HI-SHEAR CORPORATION 51
HUBBELL, INC., HARVEY 59

JACOBSON NUT MFG. CORPORATION 87

KEYSTONE STEEL & WIRE COMPANY 33
KLINCHER KAPSCREWS, INC. 32
KLINCHER LOCKNUT CORPORATION 48

LAMSON & SESSIONS COMPANY, THE 6
LAPEER MFG. COMPANY 81
LEITZKE, REIN 86
LOCK THREAD CORPORATION 67
LUCAS-MILHAUPT ENGINEERING COMPANY 82

MERCURY AIR PARTS COMPANY, INC. 74
MILFORD RIVET & MACHINE COMPANY, THE 2
MILLERS FALLS COMPANY 49
MINNESOTA MINING & MFG. COMPANY 17
MOLLY CORPORATION 80
MOORE, INC., GEORGE W. 85

NATIONAL RIVET & MFG. COMPANY 72
NEWAGE INDUSTRIES, INC. 72

OHIO ROD PRODUCTS COMPANY, INC. 86

PALNUT COMPANY, THE 65
PHEOLL MFG. COMPANY, INC. Second Cover

INDEX TO ADVERTISERS

REED ROLLED THREAD DIE COMPANY 57
REPUBLIC STEEL COMPANY 86
ROCKFORD SCREW PRODUCTS COMPANY 66 A-F
ROCKWELL PRODUCTS CORPORATION 62
ROSAN, INC. 3
ROTOR TOOL COMPANY, THE 18
RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY 55

SCREW RESEARCH ASSOCIATION 34
SECURITY LOCKNUT CORPORATION 73
SEGAL, EDWARD 83
SHAKEPROOF DIVISION (Illinois Tool Works) 25
SIMMONS FASTENER CORPORATION 15
SNAP-ON TOOLS CORPORATION 16
SOUTHCO DIVISION (South Chester Corporation) 8
SOUTHERN SCREW COMPANY 12
STANDARD PRESSED STEEL COMPANY (Industrial Fastener Division) Fourth Cover
STAR STAINLESS SCREW COMPANY 79
STIMPSON COMPANY, INC., EDWIN B. 67
STURTEVANT COMPANY, P. A. 73

TA MFG. CORPORATION 87
THOMPSON-BREMER & COMPANY (Division of American Machine & Foundry Co.) 40
THOR POWER TOOL COMPANY 52
TINNERMAN PRODUCTS, INC. 31
TITAN TOOL COMPANY 84
TOWNSEND MFG. COMPANY, THE H. P. 58

UNITED SHOE MACHINERY CORPORATION (Eyelet Division) 56
UNITED SHOE MACHINERY CORPORATION (Powasert Division) 21

WESTERN WIRE PRODUCTS COMPANY 85
WILTON TOOL MFG. COMPANY, INC. 66

ZIERICK MFG. CORPORATION 78

ONE LAST WORD

DOING WELL, THANK YOU!

Have we not all, at one time or another, puffed out our vests and smugly announced that all's well, there are no problems? This is good. Most of us are beset by questions, always, and if we don't take a breather now and again and declare a cease-fire with our problems we'd all develop ulcers the size of pumpkins—and that's big for ulcers!

The majority of us, with time, luck and the kind help of experts, friends, colleagues and an occasional hanger-on, manage to solve our difficulties; then boldly face up to the next, muttering something about there being an easier way of making a living.

But there are those who have no problems; they're doing well, thank you.

To begin with, every production man always has two basic problems: how to cut costs and how to improve quality. Let us ignore these two basic difficulties for the time being and make a bold statement: too many people don't know they have problems and will not go looking for them. This is dangerous. No improvement or progress can be made unless there is a difficult situation to overcome. Ours is a continual fight with the powers of darkness for every inch of progress. The man without problems is losing by default!

We must look for ways of increasing production, of cutting costs, of improving quality. We must hunt out troubles and problems and nasty questions. We must look for weak spots. The golden gate is not reached through wishful thinking—we are not automatically dumped unto the lap of peace. We must look for trouble . . . seek out the problems. Make some if need be, but let's have problems

The more problems we have the more we complain. And this, too, is good. A hard-working griper, slugging it out is a greater asset to a company than the chappie who's doing well, thank you. It is better to say, with all my problems, I'm doing well, thank you. For then you will enjoy the luxury and softness of the Elysian Fields, that much sought-after land where ulcers and worry disappear and where peace reigns supreme.

Wm. F. Schleicher

Vice President & Editorial Director

Into a countersunk hole, punched or drilled, of proper size.

Merely press a T Series BANC-LOK. Sharp edge of slot anchors itself to prevent turning.

Complete assembly with final locking action by inserting screw—the slotted end expands making the assembly vibration proof. Banc-Lok threads are reusable indefinitely without stripping.

Patented & Patents Pending

DO JUST THIS...

with a BANC-LOK INSERT

And You Have a Self-Locking Tapped Hole for Flush Fastening — No Costly Tapping — No Special Tools

BANC-LOK, the one-piece, self-locking insert, with reusable threads, eliminates costly tapping operations — is so quick and easy to apply that it slashes assembly costs. The T series Banc-Lok tapped hole is designed for any sheet metal fastening where non-strippable, reusable threads, with sure locking action are required. It is ideal for such applications as assembling electronic chassis, fastening hardware to metal doors and windows, locking adjusting screws and mounting instruments.

Banc-Lok tapped holes are available in a variety of designs (flat head, step type and spacers) and in a wide range of grip lengths to accommodate varying material thicknesses. For full details on sizes, types and application, send for the new Banc-Lok catalog, write:

BOOTS CORPORATION

112 NEWTOWN TURNPIKE, NORWALK, CONN. • VI 7-2727 • TWX NWLK 95-U

BOOTS-WESTERN

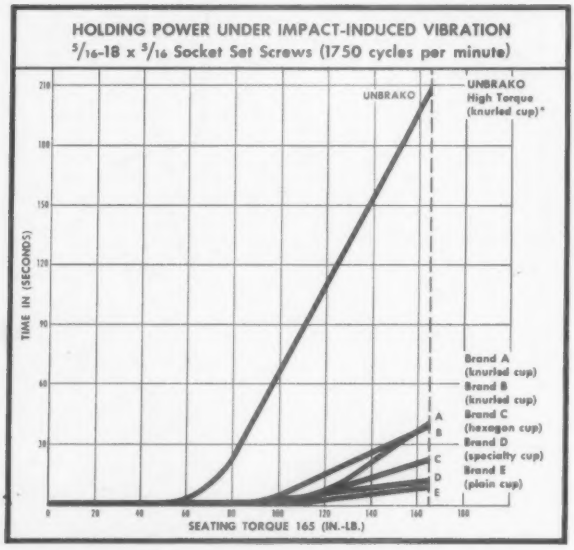
432 NORTH LAKE AVE., PASADENA, CALIF. • MU 1-6679 • TWX PASA CAL 7255-U

Use postpaid card. Circle No. 202

Is it necessary to specify socket set screws by brand?

(read this—then draw your own conclusion)

If one socket set screw is *demonstrably* better than all others, we know that you will want it on your designs.



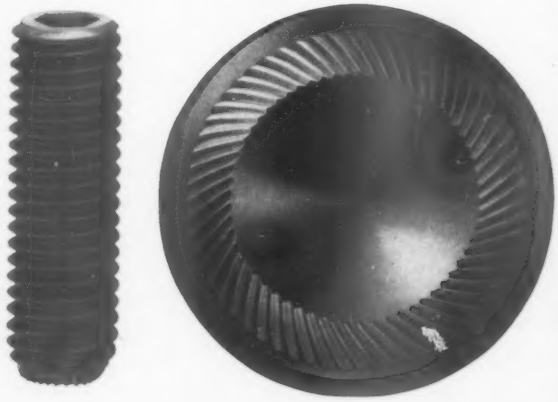
Tests conducted at SPS Laboratories for Advanced Research show UNBRAKO High Torque* with knurled cup point to be at least *five times as vibration resistant* as its closest competitor.

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES

Screw Size	Unbrako (in.-lb.)	Set Screw B (in.-lb.)	Set Screw C (in.-lb.)	Minimum Differential %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

Note well that this test was held with all screws at the same torque. Now, when we realize that with UNBRAKO the tightening torques are as much as 40% higher than those for ordinary set screws, the gap between High Torque and competitive brands becomes even greater.

Nor is there anything mysterious about the superiority of UNBRAKO. Certainly one of the main reasons—and one



that the naked eye can perceive—is the exclusive knurled cup point, which enables this screw to grip with such tenacity that it is literally self-locking.

Other signally important features that help to explain the unparalleled holding power of UNBRAKO High Torque:

- Fully formed threads with metal compressed into a closely knit grain structure and no straight lines along which shear can occur
- Precision heat treated steel to eliminate brittleness or decarburization
- Deeper sockets for maximum key engagement and wrenching power
- Radius sockets to eliminate sharp corners where cracks start during tightening

Why leave reliability to luck? Wouldn't it be wise to insist on UNBRAKO High Torque socket set screws.

* * *

UNBRAKO High Torque socket set screws are available in sizes #0 through 1 in., in alloy and stainless steels, and with Nylok†. Ask your authorized industrial distributor for complete information or write to STANDARD PRESSED STEEL CO. for booklet "More about UNBRAKO High Torque Set Screws." INDUSTRIAL FASTENER Division, SPS, JENKINTOWN 78, PENNSYLVANIA.

*Standard . . . they sell at regular price
†T.M. Reg. U.S. Pat. Off., The Nylok Corporation

sps

where reliability replaces probability

Use postpaid card. Circle No. 203